MARINE REVIEW

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TWENTY-FIVE MILLION TONS.

WONDERFUL SAULT CANAL RECORD—COMMERCE FOUR TIMES WHAT IT WAS TWELVE YEARS AGO—ALMOST DOUBLED IN FIVE YEARS.

Not even the vessel owners of the lakes themselves realize the full meaning of the announcement that twenty-five and a quarter million tons of freight passed to and from Lake Superior through the canals at Sault Ste. Marie (Canadian and United States) during the season of 1899. This is just four times as much freight as passed the Sault in 1888, twelve years ago. In five years the freight tonnage has been almost doubled, as the figures for 1894 were 13,195,850 tons. The wonderful growth of traffic in this waterway is best shown by the following table giving the number of tons of freight moved and the registered tonnage of vessels for twelve years past:

	Total freight, net tons.	Registered tonnage of vessels.
1899	25,255,810	21,958,347
1898	21,234,664	18,622,754
1897	18,982,755	17,619,933
1896	16,239,061	17,249,418
1895	15,062,580	16,806,781
1894	13,195,850	13,110,366
1893	10,796,572	8,949754
1892	11,214,333	10,647,203
1891	8,888,759	8,400,685
1890	9,041,213	8,454,435
1889	7,516,022	7,221,935
1888	6,411,423	5,130,659

The Canadian canal shared only to the extent of about 12 per cent. in the record of twenty-five million tons moved during 1899. The figures are 22,252,139 tons moved through the United States canal, as against 3,003,671 tons through the Canadian canal. The full summary of the year's commerce, as reported by the war department officials in charge of the United States canal, is as follows:

COMPARATIVE STATEMENT OF LAKE COMMERCE THROUGH CANALS AT SAULT STE. MARIE, MICHIGAN AND ONTARIO, FOR THE SEASONS OF 1898 AND 1899.

ITEMS.	Designation.	SEASONS. 1898.	SEASONS. 1899.	Increase Per cent.	Decrease Per cent.
Vessels :—Steamers	Number	12,461	14,378	15	.....
Sails	Number	4,449	4,776	7	.....
Unregistered	Number	851	1,101	29	.....
Passengers	Number	17,761	20,255	14	.....
Tonnage :—Registered	Net tons	18,622,754	21,958,347	18	.....
Freight	Net tons	21,234,664	25,255,810	19	.....
Passengers	Number	43,426	49,082	13	.....
Coal :—Hard	Net tons	540,843	841,281	56	.....
Soft	Net tons	3,235,607	3,099,606	.....	4
Flour	Barrels	7,778,043	7,114,147	.....	9
Wheat	Bushels	62,339 996	58,397,335	.....	6
Grain (other than wheat)	Bushels	26 078,384	30,000,935	15	.....
Manufactured & pig iron	Net tons	250,170	214 585	.....	14
Salt	Barrels	301,560	316,336	5	.....
Copper	Net tons	124.226	120,090	.....	3
Iron ore	Net tons	11,706,960	15,328,240	31	.....
Lumber	M.ft.B.M	895,485	1,038,057	16	.....
Silver ore	Net tons	0	487	.....	.....
Building stone	Net tons	4,670	39,063	736	.....
Unclassified freight	Net tons	623,146	587,484	.....	6

The United States canal was opened May 2 and closed December 18, 1899; season, 231 days.

The Canadian canal was opened April 26 and closed December 20, 1899; season, 239 days.

SMALL PROPORTION OF FREIGHT THROUGH CANADIAN CANAL.

The following table will prove interesting as showing the division of traffic between the two canals—Canadian and United States—and also the division of freight east and west bound:

ITEMS.	Designation.	U. S. canal.	Canadian canal	TOTAL.
Freight :				
East bound	Net tons.	18,338.253	2,281,281	20,619,534
West bound	Net tons.	3,913,886	722,390	4,636,276
Total freight	Net tons.	22,252,139	3,003,671	25,255,810
Vessels	Number.	16,480	3 775	20,255
Registered tonnage	Net tons.	19,021,489	2,936,858	21,958,347

The condition of L. M. Bowers, manager of the Bessemer Steamship Co., and who is ill at his home in this city, remains about the same. It is hoped that he will be able to get out to take the air in one or two weeks, but his recovery may be a matter of months. Mr. Bowers' scores of warm friends in Binghamton, Cleveland and elsewhere hope it will be as speedy as possible.—Binghamton Republican.

IRON ORE ON DOCK.

OUTPUT FROM LAKE SUPERIOR REGION DURING PAST YEAR WAS 4,500,000 TONS IN EXCESS OF 1898, BUT STOCKS ON LAKE ERIE DOCKS ARE ONLY HALF A MILLION TONS MORE THAN THEY WERE A YEAR AGO.

Although the output of iron ore by lake and rail from the Lake Superior region for the year 1899 exceed 18,500,000 tons (gross tons in all cases), and was full 4,500,000 tons in excess of the 1898 output, the stocks on Lake Erie docgs with the close of navigation were not quite half a million tons in excess of stocks on these docks a year ago, and they were about 400,000 tons less than at the close of navigation in 1897; this, too, as against receipts at Lake Erie docks of 15,222,187 tons during the past season, compared with 11,028,321 tons in 1898 and 10,120,906 tons in 1897. In view of the enormous consumption of iron ore that has been going on for several months past, and which is certain to continue throughout the winter, this condition certainly warrants the general expectation that stocks will be cleaned up next spring as they have never been before.

Complete returns from ore dock managers at Lake Erie ports show receipts at these docks for the past season of 15,222,187 tons, while the amount on dock with the close of navigation is 5,530,283 tons. As shown by figures presented May 1 last there was on dock at Lake Erie ports at the opening of navigation in 1899, 2,073,254 tons of ore; add to this the receipts during the season just closed 15,530,283 tons, and we have a total of 17,603,537 tons; deduct 5,530,283 tons, the amount now on dock, and we find that the shipments to furnaces between May 1 and Dec. 1, 1899, were 12,073,254 tons, against 9,059,829 tons during the same period in 1898 and 7,453,684 tons during the same period in 1897.

It will be noted that there is a difference of 2,679,171 tons between the water shipments from upper lake ports (17,901,358 tons) and receipts at Lake Erie ports (15,222,187 tons). This difference represents the ore that was moved by water to South Chicago and other points on Lake Michigan. In 1898 the water shipments to South Chicago and points other than Lake Erie ports, aggregated 2,622,467 tons, and in 1897 they were 2,094,739 tons.

Following are the tables showing receipts at Lake Erie ports and amounts on dock during five years past:

IRON ORE ON LAKE ERIE DOCKS, DEC. 1, GROSS TONS.

Ports.	1899	1898	1897	1896	1895	1894
Toledo	186,422	146,568	194,644	115,959	113,132	96,157
Sandusky	23,184	48,500	84,786	59,491	34,375	77,004
Huron	164,480	139,982	230,029	200,675	101,000	147,632
Lorain	337,822	324,034	317,509	231,288	224,264	223,733
Cleveland	1,200,806	1,175,970	1,478,355	1,419,311	1,200,792	1,441.785
Fairport	692,147	719.794	825,312	773,905	605,470	660,980
Ashtabula	1,902,598	1,732.671	1,835,694	1,441,666	1,301,382	1,439,119
Conneaut	468,808	288,101	360,895	275,800	292,468	199,365
Erie	361,335	439,167	484,871	355,222	335,718	454,233
Buffalo	192,681	121,620	111,660	82,267	207,199	94,239
Total	5,530,283	5,136,407	5,923,755	4,954,984	4,415,712	4,834,247

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS.

Ports.	1899	1898	1897	1896	1895	1894
Toledo	792,348	414,012	416,438	301,794	260,730	158,384
Sandusky	87,499	136,200	79.792	58,667	12,361	23,043
Huron	263,600	126,755	198,231	226,515	146,442	172.775
Lorain	1,112,946	536,086	355,188	191,445	214,219	150.424
Cleveland	3,222,582	2,645,318	2,456,704	2,313,170	2,312,370	1,624.573
Fairport	1,241,013	912,879	1,008,340	941.446	914,617	976 222
Ashtabula	3,341,526	2,684,563	3,001,914	2,272,822	2,474,791	1,987,722
Conneaut	2,320,696	1,404,169	495,327	327,623	244,967	237,905
Erie	1,309,961	1,092 364	1,311,526	847,849	811,389	624,438
Buffalo, Tonawanda	1,530,016	1,075,975	797,446	545,101	719,742	395,339
Total	15,222,187	11,028,321	10,120,906	8,026,432	8,112,228	6,350,825

NEW BATH BUILT SCHOONER.

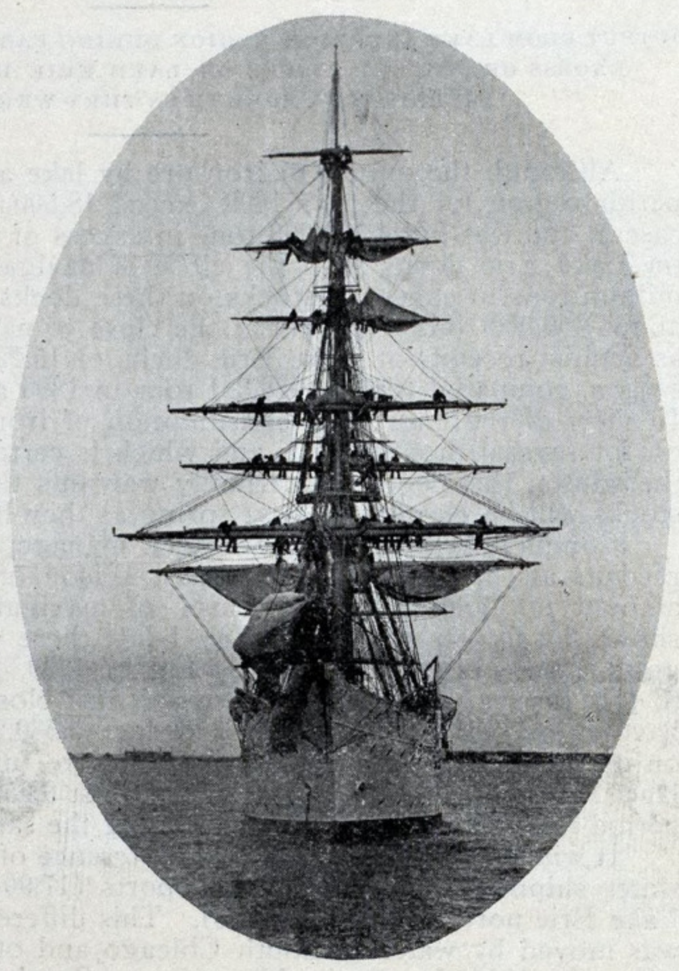
The schooner Mary W. Bowen which will be launched in the near future at the yard of the New England Ship Building Co. at Bath, Me., is the third five-masted vessel which has gone into the water at that port within a year. The Bowen is 233 feet in length, 46 feet beam and 22 feet depth. She is of 2,156 gross or 1,907 net tons burden. The vessel is of oak construction and her masts, each 110 feet in height. The captain's apartments are aft and are finished in quartered oak and sycamore. The Bowen was built for J. A. Bowen of Fall River, Mass., and will be commanded by Capt. Whitman Chase, Jr., of Taunton, Mass. The vessel, which, by the way, is the 281st launched from the yard of the New England company, is fitted with a full modern equipment including a steam windlass, two wrecking pumps and two anchors weighing respectively 5,000 and 6,000 pounds.

A new fuel will be tried on the steamers now under construction for the Asiatic service of the Hamburg-American company. The new fuel is a semi-fluid petroleum, which is imported from Borneo and is not liable to spontaneous combustion. It economizes space and permits of a reduction in the number of firemen.

TRAINING SHIP CHESAPEAKE.

FIRST SAILING VESSEL BUILT BY THE UNITED STATES GOVERNMENT IN FORTY YEARS—FAMOUS OLD VESSEL OF THE SAME NAME.

The new Chesapeake, a training ship for naval cadets and the first sailing vessel built by the United States government in forty years, is illustrated herewith. The naval appropriation bill for the year ending June 20, 1898, contained a clause appropriating $250,000 for a composite training vessel, propelled by steam and sail, to be used for the training of cadets at the naval academy. This act was afterward modified by striking out the word steam and reducing the appropriation to $125,000. Under the terms of this bill, Rear Admiral Hichborn, chief of the bureau of construction and repair, designed this model craft. She is constructed entirely of steel. The bottom is sheathed with yellow pine, 4 inches in thickness from the keel to 2 feet 2 inches above the water line, and coppered. The main battery—six 4-inch rapid-fire guns—are on the covered gun deck, with four six-pounders, rapid-fire, and two one pounders mounted on the rail and worked from the flush spar deck.



A full ship rig is provided, the lower masts and lower yards being of steel and the balance of the spars of spruce. The bulwark plating in connection with the stem is carried out to form the bowsprit. The total sail area is 19,975 square feet, the vessel depending wholly upon sails for propulsion. Boilers are fitted for supplying steam to run pumps, windlass, electric lighting plant, distilling plant, and refrigerating plant, and for heating the vessel.

Each of the 130 cadets is provided with a locker for his clothes. A large galley, especially fitted for the cadets, is located amidships on the gun deck and convenient to the galley. At the after end of the gun deck is located the cabin, a state room for the captain and spare state room, lavatory, offices for captain, executive officer and navigator, and an armory. At the extreme forward end of the deck are the water closets and wash rooms for cadets and crew. At the after end of the berth deck are the bath room and water closets for ward room officers. Just forward of the watertight bulkhead, bounding this space, are ten state rooms for ward room officers and then the ward room dining room, extending across the vessel. On the starboard side forward of the ward room dining rooms are quarters for the warrant officers; on the port side ward room pantry, paymaster's office, sick bay, bath and water closet for sick bay and dispensary.

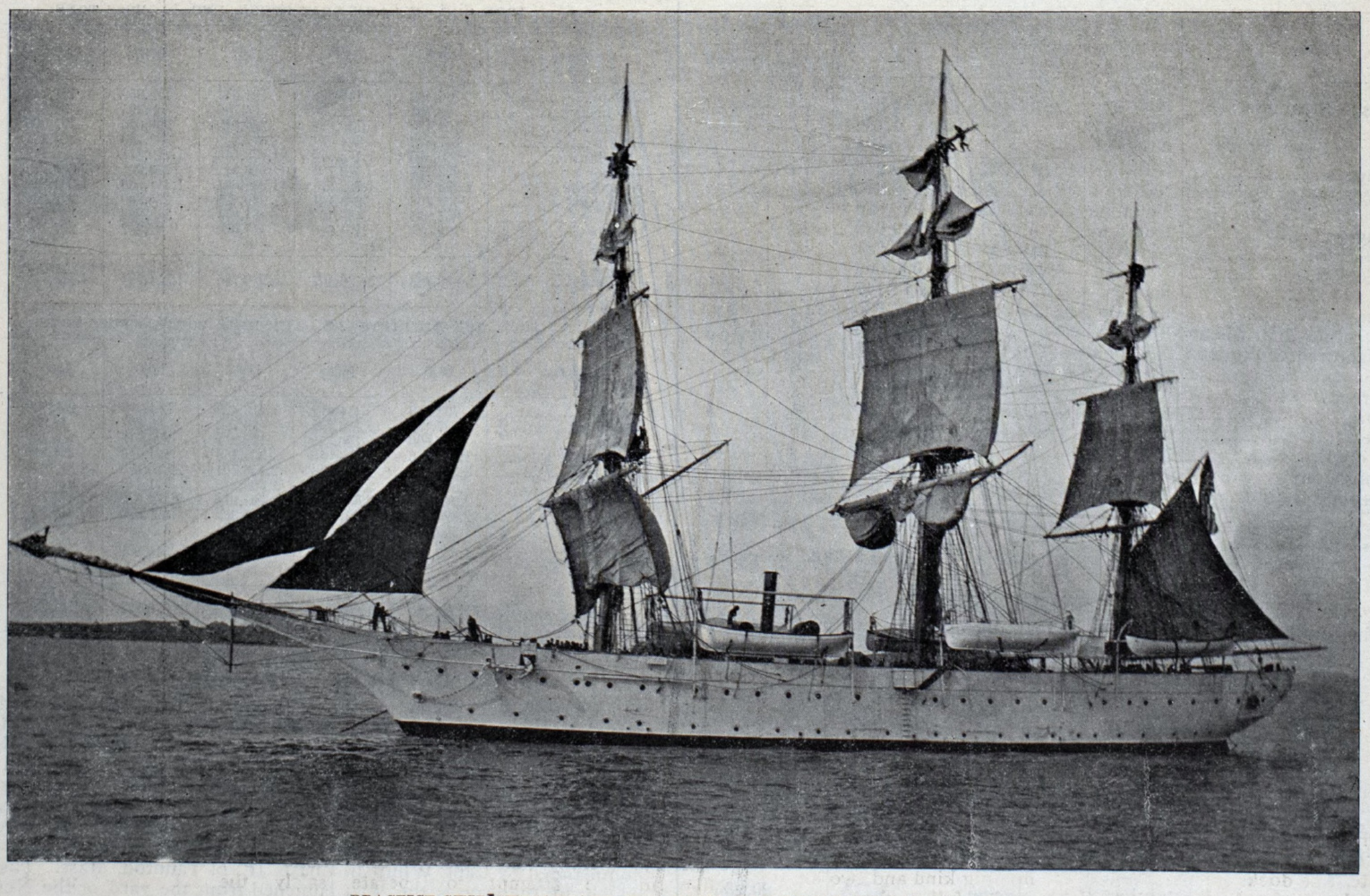
Immediately forward of an athwartship watertight bulkhead in the center is the dynamo, with sky light extending to spar deck on starboard side, a refrigerating room and on the port side the distiller room and then the entire forward space is reserved for crew's quarters. Store rooms are provided in the hold for all stores, including ammunition. Tanks are provided for 15,023 gallons of fresh water. Among the boats is a 30-foot steam cutter and a launch stowed in chocks on the rail, two 28-foot cutters, one 28-foot whale boat and one 28-foot gig whale boat carried on davits, and a 20-foot dinghy in the launch.

Principal dimensions of the Chesapeake are: Length on load water line, 175 feet; breadth on load water line, 37 feet; mean draught, 16 feet 6 inches; displacement, 1,175 tons. This vessel was built by the Bath Iron Works of Bath, Me., and heads of the navy department, as well as the superintendent of the navy department, are highly pleased with it.

THE OLD CHESAPEAKE.

The old Chesapeake is quite historical. A large force of workmen were sent to the forests of Georgia in 1795 to cut the timber for this famous ship. Work progressed slowly upon the vessel. In December, 1795, the keel had been laid and part of the frames bolted together for raising. Upon the establishment of peace between the United States and Algiers in 1796 work was suspended upon the Chesapeake, but upon the breaking out of the war with France in 1798 orders were given to again resume construction. She was launched in December, 1799, and began her ill-fated career. She made several trips to the Mediterranean to quell incipient wars.

In 1812 the Chesapeake was fired upon by the British frigate Leopard and her masts and rigging were shot to pieces. A court martial followed this incident, and Capt. Decatur was placed in command of the Chesapeake. The vessel pursued a varied career during the war and was finally taken by the British ship Shannon. Shortly afterwards she was taken to England. The British government having little use for her, she was sold to a miller, who constructed a flour mill out of her timbers. The old mill is still standing at Wickham.



PRACTICE SHIP CHESAPEAKE, U. S. NAVY—BUILT BY BATH IRON WORKS.

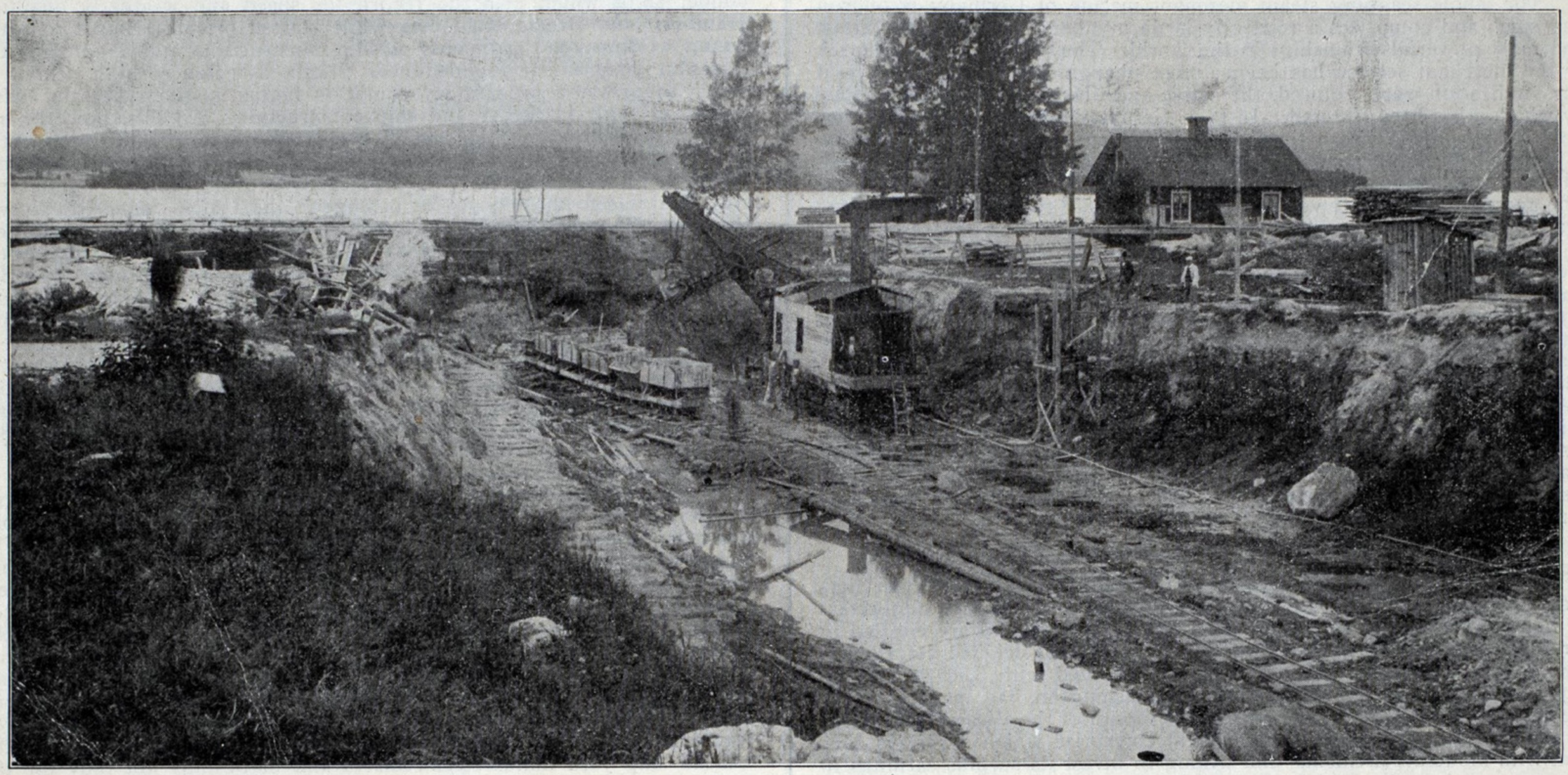
An order for fifty steel cars, which will cost about $60,000, is said to have been placed with the Pressed Steel Car Co. of Pittsburg by the Consolidated Lake Michigan Co., which is completing the Algoma Central, a line from Sault Ste. Marie to the company's iron mines in northern Ontario. The cars are to be of 50 tons capacity each. The Consolidated company has, it is claimed, an order to deliver 2,000,000 tons of ore at Sault Ste. Marie by the opening of navigation in the spring of 1900. Probably there is no more truth in the order for cars than there is in this latter statement, which is absurd.

AMERICAN STEAM SHOVEL IN SWEDEN.

More than two years ago the Grängesbergs Construction Co. of Grängesberg, Sweden, purchased from the Vulcan Iron Works Co. of Toledo O., one of the standard "Giant B" steam shovels of that firm for operation in Sweden. The shovel was shipped in August, 1897, since which time it has been constantly working in building canals, working in iron ore mines and at other work, and it is said that it is as yet the first and only steam shovel used in Sweden.

This machine is built on a car 31 feet long, 10 feet wide and constructed with 12-inch steel I beam sills. It has standard Fox patent car trucks. The capacity of the dipper is 1¾ cubic yards and the 12-inch steel dipper arms are 16 feet long, with cast steel racking; hoisting chain 1⅛ inches. The crane is 23 feet high above the track, and 21 feet out from the mast. It is capable of a 15-foot clear lift with the dipper door open. It will dump 25 feet from the center of the mast each way. It has hoisting engines of 90 horse power, swinging engines of 20 horse power, and crane engines of 15 horse power. The weight of the shovel is 60 tons. In operation the machine consumes one ton of soft coal and 2,000 gallons of water per day, and the total daily operating expenses are about $23. The capacity of the machine to dig and load into cars is 2,000 cubic yards of earth or ordinary material, or 3,500 tons of iron ore in a day of 10 hours.

The machine as shown in the accompanying illustration was at work excavating a channel 1,500 feet long, 20 feet deep and 80 feet wide at the surface at Grängesberg, Sweden, beginning with May of this year. This channel is intended to furnish water for a new 3,500 horse power electric power station at the water falls at Lernbo, for mine operation. The work encountered at this point has been quite difficult. The ground consists of a very hard mixture of clay, sand and gravel, in some places so hard that the material could hardly be loosened with a pick. As evidence of the hardness of the ground it is officially stated that three sets of dipper teeth were worn out during four months of operation. Under these conditions the volume of excavation per day of ten hours has averaged 825 cubic yards, which could have been largely exceeded, however, had the conditions for distribution of the excavated material been more favorable to the forcing of the shovel work.—Railway Review.



AMERICAN STEAM SHOVEL WORKING IN SWEDEN.

A GREAT SHIP REPAIR WORKS.

The Erie Basin Dry Dock, under the management of the John M. Robins Co., New York, has of late, more than ever, added to its large volume of ship yard operations, especially in repair lines. Of course a concern that has turned out such vessels as the steam yachts Marietta and Sovereign has no intention of abandoning new work, but repair jobs are commanding a constantly increasing share of this company's attention. On the day following Christmas there was almost 25,000 tons out of water at these dry docks. This inclded the steamers Statenden, Indra, Vigilancia and the Plymouth of the Fall River line. Even then, one of the five docks was open for an emergency should it arise. It is said that this ship yard, which is only 20 minutes journey from the Battery, New York, is now the largest repair plant in the United States. The machine, boiler, joiner and paint shops have of necessity been enlarged on several occasions of late. The docks include three of the floating kind and two excavated timber docks, fitted with electric lights and a full equipment of Pneumatic tools. Over 3,000 men are employed. The active management is in the hands of W. D. Dickey.

The United States navy department will adopt the Miller system of coaling vessels at sea as a result of the report submitted by the board of officers who witnessed the recent tests. The board is emphatic in the declaration that the invention would be of great value in time of war. In heavy weather twenty tons per hour were transferred by means of the system from the collier Marcellus to the battleship Massachusetts.

SUBMARINE VESSELS FOR COMMERCIAL PURPOSES.

John P. Holland, famous inventor of the Holland submarine torpedo boat, says in a recent issue of the New York Journal that navigation under the sea can by no possibility be carried on at a depth greater than 300 feet. The pressure of the water below that depth is so great that any boat man could build would be crushed. It is impossible for a man to work under water lower than 150 feet below the water's surface. Neither will it be possible, he says, to recover very much property lost by shipwreck at sea. The exception will be in comparatively shallow water, in which even already, divers can do work with perfect impunity. As to the commercial uses to which submarine boats will be applied, Mr. Holland says:

"They will be used for sponge and pearl fishing, engineering and ferry boating. The problem of bridge and lighthouse building will be greatly simplified when we have constructed boats which can work under water for a considerable length of time. I believe the time is near at hand when vessels can carry a boatload of men to the bottom of a body of water and remain there during the whole of a working day. Foundations can be laid with the same accuracy that is maintained on land above water. Materials can be carried below and utilized with great rapidity. A submarine boat will also be extremely valuable for surveying the topography of land under water. Boats can proceed along the surface of the bottom and by automatic registers obtain with absolute accuracy the precise formation of bottom. This will be of very great value in war when, as in Manila bay, the ships of a fleet sail into a strange harbor. Submarine ferryboats could be made which would be absolutely safe from collisions and which, in places like the English channel, would be free from the inconveniences of storms and heavy seas. Vessels could be built which would automatically remain at a certain depth below the surface, and arrangements could be perfected by which boats going in opposite directions would move at different depths, thus avoiding all possibility of collision.

"The problem of submarine navigation has been solved, not by the application of the principles upon which the fish swims under water, but by utilizing a few simple principles of mechanics. The fish swims by inflating his body with air when he wishes to go to the surface of the water, and by discharging the air when he wishes to go below. The practicable submarine boat, however, must be as near as possible to the specific weight of water. My own boat weighs about 250 pounds less than an equal bulk of salt water. Thus if the machinery ever gets out of order it will immediately rise to the top. The descent into the water or the rising to the surface is controlled by a sort of wing in the back of the boat which operates very much as the rudder. Fresh air is supplied by slowly releasing through reducing valves thirty cubic feet of compressed air that is carried by the boat. This air is released into a first and second chamber before being turned loose entirely, so that finally it becomes of a normal pressure. The pressure never varied one ounce to the square inch.

"The speed of under-water boats is limited by the power that can be put into them. Electric storage batteries must in all cases be used. Experiments were made with petroleum steam engines and with other propelling machinery, but none of them proved of value in the attempt to operate safely the submarine vessel. The invention of the electric storage battery has made submarine navigation possible for practicable uses, for it greatly increased the possible radius of action. It will thus be easily seen that a boat might travel one mile at 20 knots but that in doing so as much power would be expended as would be necessary to carry the boat two miles at 15 knots.

"Submarine navigation is henceforth simply a question of development. I do not think vessels will ever be very large, for there would be no use for them. But for all the uses I have mentioned I feel confident that in a very few years submarine vessels will be running, and that they will grow rapidly into use."

STRIKING GROWTH OF GERMANY'S MERCHANT MARINE.

BY FRANK H. MASON,

U. S. CONSUL-GENERAL AT BERLIN.*

In the whole record of German progress and development during the past thirty years, no chapter is more striking than that which describes the growth and improvement of its commercial marine, which now ranks second among European nations to that of Great Britain alone. The two largest, wealthiest and most powerful steamship companies in the world are German and are located at Hamburg and Bremen, and the whole merchant marine of Germany included, on Jan. 1, 1898 (the date of the last published official statistics), 2,522 sailing vessels of 585,571 tons net measurement, manned by 14,162 sailors, and 1,171 seagoing steamers of 969,800 tons and crews numbering 28,266 men, a total of 3,693 seagoing vessels of 1,555,371 tons net measurement and manned by 42,428 men. The process of development has been, here as elsewhere, an increase in the size of vessels, the elimination of sailing ships and their substitution by steam craft, and a steady decrease in the number of men employed in proportion to the tonnage under steam and sail. Thus, on Jan. 1, 1871, the German merchant fleet included 4,372 sailing vessels with a tonnage of 900,301 and manned by 34,739 men. During the intervening twenty-nine years the sailing vessels, as we have seen, fell away to the extent of 1,820 ships, 314,730 tons, and 20,577 men. Of the 2,552 sailing vessels now under the German flag, 1,986 are of wood; but they are mainly small, so that the remaining 566 modern steel and iron sailers comprise more than two-thirds of the entire tonnage of the sailing fleet.

The whole seagoing steam merchant marine of Germany is of iron and steel, and comprises a relatively large number of the largest, fastest and most powerful steamships in the world. The growth of this branch of the merchant service has been almost phenomenal, and vindicates, if any vindication were required, the active and liberal governmental policy by which it has been fostered. In 1871, Germany had in her ocean service only 147 steamers, with a tonnage of 81,994 and 4,736 men, the average capacity of the ships being only 558 tons. The statistics for 1898 show, as has been seen, an increase of 1,024 steamers, 887,906 tons, and 23,530 men. The average tonnage per vessel increased from 558 to 828 and the average crew decreased from thirty-two men to twenty-four.

A forcible illustration of the growth and importance of the German merchant marine is furnished by the statistics of the single port of Hamburg. During the year 1898, there were in operation from that port 112 regular lines of steamers, of which sixty-one flew the German flag. These lines operated 792 steamers, of which 495 were of German register. They made a total of 6,247 voyages and carried 4,500,000 tons of freight, as compared with 4,683 voyages and 3,500,000 tons carried in 1890. Germany has to-day twenty-seven regular lines of steamships to European ports and thirty-four to the rest of the world—the Americas, Africa, Australasia, Asia, and every island of the sea that offers a present or promises a future trade with the Fatherland. Of the entire tonnage carried by these lines last year, 1,793,742 tons were for European ports and 2,663,407 tons were for countries outside of Europe.

THE TWO GREAT GERMAN LINES.

The two greatest German steamship companies, viz., the North German Lloyd and the Hamburg-American company, have their headquarters or home ports respectively at Bremen and Hamburg, and are entitled in a report of this character to a separate and somewhat detailed description. The North German Lloyd company was founded with 3,000,000 florins capital in 1857, just ten years after the Washington had made the first steamship voyage from New York to the mouth of the Weser. By virtue of able management and that intelligent enterprise which is always content with moderate dividends and willing to invest its surplus earnings in the renewal, increase, and improvement of its equipment, the Lloyd has risen in forty-two years to a foremost position among all organizations of its class, with an active capital of more than 100,000,000 marks ($23,800,000) and seventy-three steamships in actual service which aggregate 237,550 horse power and 266,138 gross tons register. At the head of this fleet stands the Kaiser Wilhelm der Grosse, with engines of 28,000 horsepower, 14,349 tons register, and the blue ribbon of the sea for speed in successive trans-Atlantic voyages. On April 25 last, the company had under construction ten steamships, of which one, the Grosser Kurfürst, is of 12,500 tons, four others of 10,000 tons each, three of 7,500 and two of 5,000 tons each, the whole aggregating 51,000 horse power. A notable feature in the management of this company has been its readiness to spend large sums of money in keeping its fleet up to the highest standard of efficiency, sacrificing vessels while still capable of fairly good service and replacing them with others of a larger, faster, costlier and more modern type. Of its whole active fleet, only two steamships remain which were in service in 1886, thirteen years ago. Since that time, the company has sold twenty-six steamers and built or bought fifty-one. It carried in 1898 161,963 passengers, of whom 114,268 were between Europe and North America. At the close of last year the North German Lloyd had carried on trans-oceanic voyages 3,709,980 passengers, and during that one year transported 1,983,482 cubic meters of freight. Its principal lines are from Bremen direct to and from New York, Baltimore, Galveston, South America, eastern Asia (China and Japan) and Australia, besides a regular line between Genoa and New York. The company has sold during the past year three steamers—the Fulda, Havel and Werra—which would have been considered first-class vessels five or six years ago, and rejected the Kaiser Friedrich, a new vessel of 12,431 tons and 25,000 horse power, because she did not fulfill the contract specifications as to speed.

The Hamburg-American Steamship Co. was founded in 1847, with 465.000 marks ($106,950) capital, and began business with two large sailing ships, which in that year carried 168 passengers between Hamburg and New York. For more than fifty years the company has grown and developed along the same lines as its great rival in Bremen, until at the beginning of 1897 it had in service sixty-four ocean steamers with 241,507 tons register and 164,255 indicated horse power. These included steamships like the Fürst Bismarck, Normannia, Augusta Victoria and Columbia of more than 8,000 tons and up to 16,400 horse power, two of which were sold to Spain because they no longer fulfilled the requirements of the company's trans-Atlantic service. At the same date (January, 1897), it had in construction four ships—the Pretoria, Brasilia, Belgia and Patricia—three of 10,000 tons each and one of 13,500 tons, which have since been completed and put into service. Of all the vessels which carried the flag of the Hamburg-American company in 1886, but three were on its active list in 1896, and it had meanwhile lost one steamer, sold thirty-two and built or purchased seventy-two. Its capital has grown to 78,000,000 marks ($18,564,000), and, together with the North German Lloyd, it controls more than one-half of the entire steam merchant fleet of Germany.

STEAMSHIP BUILDING IN GERMANY.

During the period from 1830 to 1850, the wooden sailing vessels which constituted Germany's merchant fleet were built mainly at ship yards on the Elbe, the Weser and along the coast of the North Sea, all of which were at that time in a highly flourishing condition. In those days master ship builders had usually taken a course of study at the ship building school in Copenhagen and served a subsequent apprenticeship in some American ship yard, where they studied the art of building those famous clipper ships which held the record for speed and weatherly qualities. Hamburg and Bremen had meanwhile started private schools to teach young workmen the rudiments of ship construction, and about 1836 the Prussian government founded near Stettin a technical high school in which there was a preparatory course in higher mathematics and a full course of study in theory and ship construction. All this, however, related to wooden vessels, and the effect of such instruction was seen in the fine, large, clipper-built sailers that went out between 1850 and 1860 from Bremen and Hamburg, carrying the steadily growing throng of emigrants who swarmed to those ports for passage to the United States—for it was the emigrant trade that laid the keels, so to speak, of the two great German steamship companies of to-day. Then came the period when Great Britain—which had first built ocean steamships—substituted iron for wood in ship building and took the lead in the new era of construction. Germany was handicapped in the start by want of resources and experience in iron working and still more by a general lack of confidence—even on part of German ship owners—that the ship yards of this country could turn out iron vessels comparable in quality and price with those produced by British constructors. The managers of the Lloyd and Hamburg companies shared this distrust, and down to as late a date as 1880 their steamers were practically all built on the Clyde and the Mersey.

Meanwhile, ten years earlier, and just before the memorable epoch of 1870, the Prussian government had established at Kiel ands Wilhelmshaven yards for the construction and repair of war vessels, which work had been hitherto done almost exclusively in this country at Danzig. The events of 1870 made it imperative for the newly consolidated German Empire to build and equip a navy in its own ship yards and at the earliest possible moment. The government yards were inadequate to the task, so a contract was given to the private Vulcan ship yard at Stettin for the construction of the armored frigate Preussen, which was so quickly and satisfactorily executed that a second vessel, the armored corvette Hansa, was ordered. The building of the Preussen marks the date of the revival. The confidence of the admiralty was secured; it was shown that armored war vessels could be designed and constructed in Germany, and to-day the Vulcan ship yard builds steel cruisers and battleships not only for the Fatherland, but for Japan, China and the republics of South America.

The great merchant ship owners were still skeptical, however, and it was not until fifteen years after the launch of the Preussen that the North German Lloyd and the Hamburg-American gained sufficient confidence in their home builders to withdraw their patronage from British constructors. That they did this at all was mainly due to the fact that they were forced into it by an act of legislation. About 1884, the imperial statute was enacted granting important subsidies to the North German Lloyd for a line of mail steamers to eastern Asia and Australia, with the stipulation that the steamships receiving such subsidy must be built in German ship yards by German workmen, and, so far as was practicable, of German materials. A contract for six imperial mail steamships was let to the Vulcan company, and they were delivered during 1886 and 1887. Each ship met every requirement, and the six collectively demonstrated that steamship building had reached in Germany the best standard of British and French construction. The effect was a rush of orders for both war and merchant steamers, not only to the Vulcan works, but to the Germania yard at o al belonging to the Weser company, to Schichau at Danzig and to others. The latest productions of the Vulcan yard—ships like the Kaiser Wilhelm der Grosse, Friedrich der Grosse, and Königin Luise of the German Lloyd and the Augusta Victoria, Fürst Bismarck, Patricia and Palatia of the Hamburg-American—place the Vulcan works at Stettin in the front rank of modern steamship builders. They were established in 1851 by a private firm; in 1857, this was converted into a stock company with 1,000,000 thalers ($714,000) capital, which has been since increased to $1,904,000, with plant and property valued at $5,500,000. The entire plant covers 58 acres, and the actual floor area of its workshops is more than 60,000 square yards. The company now employs 6,500 workmen and has built in all 247 ships, of which sixty-one were war vessels, 137 mercantile steamers with single or double screws, and 49 paddle boats for river and estuary service where light draught of water was an essential requisite. The merchant marine of Germany is under the general supervision of the marine bureau of the department of the interior (Reichsamt des Innern), No. 74 Wilhelm Strasse, Berlin, and elaborate statistics of new constructions, losses through shipwreck, etc., are published every two years in an official report.

The materials for ship building, although largely of German origin,

*A special report to the state department.

include a considerable proportion of foreign materials imported under the law of July 15, 1879, which grants free entry to all materials, fixtures, and even guns, which are to be used in the construction, repair and equipment of both war and mercantile vessels. Under this provision there were imported free during the year 1898, 4,498 tons of pig iron, 8,969 tons of structural iron, 5,048 tons of wrought cranks and shafting, 28,246 tons of steel and iron plating for hulls, 1,280 tons of anchors, 1,252 tons of heavy castings, 69,268 tons of sawed lumber, 72,234 tons of hewn timber, besides quantities of cordage, hemp and other materials. The chief source of the iron and steel employed in ship construction is Westphalia, whence it is transported to the northern ship yards, either by water via the Rhine and North sea or across country by rail, special low rates being granted on the Prussian government railways for all materials intended for this purpose. One of the most potent arguments in favor of the Dortmund-Ems canal, which was opened from Dortmund to Emden during the past summer, was that it would facilitate the shipment of iron and steel for ship building purposes from the interior of Westphalia to the ship yards on the northern coast. The great steel works of Friederich Krupp at Essen make not only guns and armor plate for war vessels, but all kinds of large forgings, stems, rudder frames, propeller shafts and heavy framework and engine parts for both war and merchant steamers. But the principal ship yards at Hamburg, Kiel, Stettin and Danzig are so fully equipped as to be practically independent of outside assistance in these respects.

GOVERNMENT SUPPORT OF SHIPBUILDING AND NAVIGATION.

It has been shown in this report that the turning point in the development of naval construction in Germany was during the years immediately following 1870, when the necessity of beginning immediately an armored fleet for the newly consolidated Empire compelled the admiralty to not only increase the equipment and capacity of its own ship yards, but to give contracts for ironclad vessels to private German constructors. Similarly, the first real opportunity given to a home shipyard by either of the great navigation companies at Bremen and Hamburg, was when a government subsidy compelled the Lloyds to place a contract for six imperial mail liners for the China and Australian service where they could be built by German workmen, and, as far as practicable, with German materials. We have seen that since 1879 all materials needed and used for ship building have been imported free of duty, and that the government railways have hauled steel, iron, lumber, etc., from foundries to ship yards at the bare cost of handling and transportation. All this was much, but it can safely be said that the great lines which now connect the two principal German ports with Asia, Australasia and the German colonies in East Africa would not and could not have been established and maintained during the earlier years of struggle and uncertainty had they not received the direct, liberal and assured support of the government through fixed annual subsidies. This policy was inaugurated under the vigorous leadership of Prince Bismarck, then chancellor of the empire, who, on April 6, 1881, submitted to the German Parliament a long and elaborate memorial based upon a review of the French mercantile marine act of Jan. 29 in that year, which appropriated $4,590,000 per annum as subsidies to steamship lines from France to Corsica, Brazil and La Plata, New York and West Indies, India, China, Algiers and Tunis. The memorial also showed in detail how Great Britain was paying annually at the same time in postal subsidies £641,656 (approximately $3,118,448) for lines to South America, East Indies, China, Japan, West Indies, Africa and the United States, while Italy expended for similar purposes, in 1879, $1,593,214 and Austria, $1,034,844.

Germany had, at that time, been living about eleven years under an imperial government, and was rapidly changing from an agricultural to an industrial and commercial nation. Bismarck had the sagacity to see that the time would soon come—had indeed come—when Germany must have new and extended foreign markets for her surplus manufactured products or languish from congestion, as her productive energies overran the purchasing power of her own people. His appeal to the Reichstag was based upon the experience and adopted policies of France and Great Britain, the rivals from whom Germany had then most to fear, and met with immediate and cordial response. A convention was framed and entered into by the imperial government and the North German Lloyd Steamship Co., by which the latter bound itself to establish and work for fifteen years three main lines of steamships: First, a line from Bremerhaven to China, with a branch line from Hongkong via Yokohama and Hiogo to Korea; second, a line from Bremerhaven to Australia, by way of a Dutch or Belgian port, with a branch service from Sydney via the Tonga islands to Apia and back to Sydney; and, third, a line from Trieste via Brindisi to Alexandria. The contract included thirty-four sections and prescribed in full detail the number of voyages to be made by each line, the average speed to be maintained, the number and tonnage of new liners to be built in German yards of German material and manned throughout by German subjects; fixed penalties for violation or neglect of any stipulation; prescribed reduced rates for transportation of German officers, soldiers, marines and civil officials, etc. For this service, the imperial government bound itself to pay a yearly subsidy of 4,400,000 marks ($1,047,500). The first steamer on the China line left Bremerhaven on June 30, 1886, with imposing ceremonies befitting such an occasion, stopped at Antwerp, where similar proceedings took place, and then sailed away for Hongkong, thereby opening what was felt to be an important new chapter in the commercial development of Germany. The success of the Asian and Australian lines in opening new fields for German export pointed the way to a second enterprise of the same character, and on May 9, 1890, a new convention was made with the North German Lloyd Co. to put on a monthly line of steamships between Hamburg and Delagoa bay, via Lisbon, Naples, Port Said, Aden, Zanzibar and Dar es-Salaam with coast lines between Zanzibar and Lamu, Bagamoyo, Saadani, Pangani, Tonga, Kilwa, Lindi, Ibo and other African ports. For this service the government bound itself to pay an annual subsidy of 900,000 marks ($214,200). These contracts have been amended and enlarged, always with the purpose of securing higher speed, more frequent voyages and better service.

After fifteen years of successful operation, the original contract for the eastern Asia and Australian lines was renewed for a similar period, with various modifications, on Oct. 30, 1898. Among the more important changes were the following: The terminus of the China line was made at Shanghai, instead of Hongkong, and it includes intermediate stoppages at a port in Belgium or Holland, at Genoa, Naples, Port Said, Suez, Aden, Colombo and Singapore. A separate line is established between Bremen or Hamburg and Japan, with terminus at Yokohama and stops at Hiogo, Nagasaki, Hongkong and the other intermediate ports specified for the China line. Branch lines are provided from Hongkong to Shanghai and another branch from Singapore to several specified ports in the Dutch East Indies and Sunda Archipelago to New Guinea. The maximum standard speed is raised to 13½ knots per hour, and all new steamers built for this service shall be of not less than 6,000 tons register. The new contract took effect on April 1 last, and for its fulfillment the company is to receive in monthly payments an annual subsidy of 5,590,000 marks ($1,330,420). The next step in contemplation is the establishment of a new monthly line by the Hamburg-American company direct to the German Chinese port of Kyao-chau, and for this purpose a bill is in preparation to be submitted to the Reichstag at its coming session.

When it is considered what the East Asian, the Australian, East African and Mediterranean lines of the North German Lloyd have done for the foreign commerce and the national influence and progress of Germany during the past fifteen years, at an expenditure of a little more than $1,250,000 per annum, there is presented a striking lesson of what can be done by persistent, well-sustained effort, carefully planned and faithfully carried out. The convention of Oct. 30, 1898, between the imperial government and the North German Lloyd comprises forty-four articles. It is an example of a German state paper in which every contingency is foreseen, and no detail, however minute, omitted which can contribute to the completeness of the service which is therein provided for and secured. Not only has the German merchant marine been thus liberally and consistently supported by subsidies of money from the public treasury, but it has been encouraged, applauded and honored by the entire influence of the imperial government, which in a country like this, where royal favor is so potent and eagerly sought for, is an important element of success. The emperor is not only an enthusiastic yachtsman and sailor, but he is under all circumstances an ardent and powerful advocate of expansion and improvement of the German fleet and merchant marine. No capitalists or business men are more honored in Germany than those who have contributed to these results. When in November last, Consul Meier, founder of the North German Lloyd Co., died in his ninetieth year, the honors bestowed upon his memory were of princely splendor and solemnity. When Capt. Schmidt brought home the lame and battered Bulgaria from her long and perilous battle with wintry seas, the Emperor's thanks and medals met him at the gang plank, and he and his men became heroes in the recognition of their government and countrymen. There are not lacking conservatives—mainly agrarians and socialist reactionaries—who have opposed this policy as they oppose improvements in the canals and internal water routes of this country, but they do not control the policy of Germany, and, in all probability, never will.

A MILLION TONS OF COAL COVERED.

Contracts covering fully a million tons of coal to be moved to the head of Lake Superior next season, all of it at 50 cents a ton, have been closed with four or five vessel owners. James Davidson of West Bay City and J. C. Gilchrist of Cleveland have engaged to carry something more than half of this million tons. There is more coal to be had at the same price, but vessel owners are apparently not in a hurry to take it, although $1.25 on ore and 50 cents on coal seem like big rates compared with 60 cents and 30 cents, which were, respectively, the contract rates of the past year. The coal shippers are also trying to cover quite a large amount of coal that is to go to Portage. They are offering 55 cents, but the vessel owners who are disposed to take any of this coal ask 60 cents. It cannot be learned that any contracts have been made at either figure. Shipments of soft coal to all ports on Lake Superior during the season just closed aggregated 3,235,000 tons. From present indications this total will probably be exceeded by fully a million tons next year, as the high freights and car shortage of 1899, especially in the fall, restricted shipments, and coal is, of course, now being used in the northwest, as in all other parts of the country, to a greater extent than ever before. It is quite probable, therefore, that there is still a very large amount of coal to be carried by season contracts, not only for Lake Superior, but for Lake Michigan ports, where it cannot be learned that anything has been done as yet. It is probable also that the coal shippers, demanding better prices for their product than in the past, will not be disposed to take chances on "wild" freights to as great an extent as in other years, especially in view of the carrying charges they were called upon to pay last year, but there will probably be little more done in the way of freight contracts or sales of coal until after the meeting of miners in the latter part of the present month, when wages are to be fixed.

In the round-up of affairs of the Pittsburg Coal Co., the big consolidation that recently secured full control of the Pittsburg district, several well-known coal shipping concerns of Cleveland are passing out of existence, among them Osborne, Saeger & Co., Pittsburg & Chicago Gas Coal Co., the Walsh-Upstill Co., New York & Cleveland Gas Coal Co., Morgan, Moore & Baine and the Cuddy-Mullen Coal Co. Two other firms that have been engaged in mining and selling Pittsburg coal, M. A. Hanna & Co. and Pickands, Mather & Co., retain their identity but under contracts with the consolidation. Martin Mullen of the Cuddy-Mullen company did not sell his half interest in that concern. He continues in opposition to the consolidation. Cleveland coal men now holding places in the consolidation are: Mr. Osborne of Osborne, Saeger & Co., president; Mr. Saeger, in sales department; Mr. Robbins of the same firm, in charge of the chartering of vessels; John A. Donaldson, who was with the Pittsburg & Chicago Gas Coal Co., now in charge of Lake Erie docks, car dumps and steamboat fueling; Mr. James Walsh, sales department. Mr. J. S. Ashley, who was agant for the New York & Cleveland Gas Coal Co., has taken a position with M. A. Hanna & Co., where he will continue in about the same line of work in which he was formerly engaged.

AMERICAN COMPETITION.*

ITS EFFECT ON ENGLISH INDUSTRIES—MR. G. W. DICKIE, MANAGER OF THE UNION IRON WORKS, SAN FRANCISCO, DOES NOT SHARE IN THE OPINION HELD BY OTHER MANUFACTURERS WHO HAVE WRITTEN TO ENGINEERING OF LONDON.

Some time ago I was asked to contribute an article on American competition and its probable effect on English home and foreign markets; but after a careful study of the subject, and taking an inventory of all I could possibly write of what might be worth reading in regard thereto, it became evident to me that I was not in possession of any new facts, or any theories, in regard to the question of the effect that American competition might have on British industries, that would benefit the readers of Engineering. I was, therefore, obliged to decline. On receiving a second request to contribute something on the subject, and having read the first of these articles, I thought that, after all, there might be something for one to say who considered this question from a distant standpoint; from that part of America that looks out on the Pacific, and that at present is watching for an opening of Asiatic markets that will give the Pacific coast of America a great transpacific commerce.

I am somewhat in doubt as to whether there has been as yet any serious invasion of either the home or foreign markets that have been considered British by American manufacturers. There have been times when the manufacturer of this country has been unable to sell the whole product of his factories at home, and has been forced to take the surplus to a foreign market, and there sell it for what it would bring, and this usually at a loss to himself; for as soon as the home demand equals his capacity, the foreign trade that he sacrificed so much to obtain is at once abandoned, and is never thought of again, until another surplus of products needs to be disposed of. There are, it is true, certain lines of American products that have a steady market in Britain as well as in Continental countries. Thus in engineering works there are special American tools, invented and perfected in this country, that are perferred to tools made elsewhere for the same purposes. In the smaller class of machine tools, American makers have for many years been far in advance of British makers, both in design and diversity of function. This, I think, is conceded by British tool makers. But in very heavy machine tools for shaping large masses of steel either into rough or accurate finished forms, the British tool maker is yet ahead of those in this country. In the case of machine tools, price does not, as a rule, secure the sale; but adaptability to the work in hand, and quantity of accurate work turned out, with the least cost for operating. In these qualities the small American tools excel. In large tools for heavy work having great rigidity, with large surfaces of great accuracy, producing large pieces finished true to form, the British tool maker still commands the best markets in the world for such tools.

In steam engines of the highest class, and of the stationary type, some American forms, such as the Corliss engine in its varied applications, has established itself wherever steam is used economically; and some American builders have from time to time, been able to export and install in British cities, in the very midst of famous engine builders, examples of American skill in engine building. But I doubt very much if this could be taken as an evidence that a high-class steam engine can be built more cheaply in America than in Great Britain. As has been pointed out in these articles, the American excels in the manufacturing instinct; he manufactures in engineering, which the British engineer seldom does. The American engine builder will adopt a certain type of engine, concentrate his own skill and that of his works on perfecting that type, and put it on the market; not a crude machine for other builders to improve upon, but as perfect as his skill can make it, rigidly tested, not only for economy, but also for durability, uniformity, speed and other functions, combined with simplicity and attractive design. This is at once the reason of the ability of the American manufacturer of machinery to compete with the British maker of machines, and also the reason why, in the production of original designs for special purposes, the British builder can more than hold his own against the American.

A good deal has been written in regard to the superiority of American workmen; but I think more is due to the manufacturing system than to the superiority of the workmen in this country. In fact, I believe the system of production in the United States aims at dispensing, as far as possible, with the necessity of skilled workmen. Every year we are finding it more and more difficult to obtain skilled workmen that can do general work in an engineering establishment; and in such branches of engineering as ship building and marine engine building, good workmen are harder to get here than they are in Great Britain. In fact, the majority of those employed in the ship building trades in this country come from the British yards; and they can do no more here than they did at home.

We ship builders on the Pacific coast think that, given a free hand in design, we could produce ships as cheaply as those built in British yards; but if we build the same ships as they do there, and pay more for material and more for labor than they do, our ships will cost more in proportion; where work—riveting, for instance—is done by piece, we cannot get men to do it at English prices. We are paying $4 per hundred for rivets that are driven in England for $2.37½. We are driving rivets by pneumatic riveters at half the price for labor as for those driven by hand; but the British ship yards are now, or will very soon be, doing likewise. In this business of ship building, the American idea of manufacturing cannot be carried out to the extent that it is in other industries, unless some combination of building and owning were made possible, that would admit of a given number of types of vessels being designed to meet the varied needs of commerce, and then manufacturing them as required. This might help in the production of ships at a less cost than now; but with the large proportion of labor, skilled and unskilled, required in the building of ships, and its efficiency being practically the same in any two countries, the country that gets its labor cheapest will build its ships cheapest, unless there is some other factor in production that balances the effect of wages. Material is a large item in the building of ships and marine engines, and that is, perhaps, the most difficult quantity that the American ship builder has to deal with; and I doubt whether any prominent ship building industry of such magnitude as would be seriously felt by the British ship builder, can be established in this country, until the vast fluctuations that take place in the prices of materials cease to exist.

In the first of these articles on American competition, the author, Col. E. A. Stevens, refers to what the ship builder can count on in regard to steel material. He says, an ironmaster known the world over, and thoroughly acquainted with American and English labor, lately remarked, in speaking of the prospect of successful American competion in ship building: "I will contract to put down all the steel needed in an Atlantic coast ship yard at lower prices than it can be had in any British ship yard. If, with this advantage, and with American labor, you cannot beat the English ship builders it will only be because you are not man enough to handle such an undertaking. It only needs the right man, and there are plenty of them in this country." This sounded very well, and at the time it was said appeared to be true. The same ironmaster was then actually exporting steel material for ship building and selling it to British ship builders below the prices ruling in their own country. But what is the condition in regard to price of ship plates today? This ironmaster who was ready but a few months ago to deliver material to ship yards in this country at a price below that paid for like material in British yards, is asking today for steel ship plates 13l. 17s. 8d. per ton, the English price being 8l. 5s. As a proof that American steel makers are not seeking foreign markets, we have only to note that these markets have no influence whatever on steel prices in this country. While the English price for steel ship plates advanced 12½ per cent., the American price for the same material advanced 120 per cent.

Any competition in ship building that may arise between America and England will likely be the result of legislation in this country to make it possible for an American ship owner to pay a higher price for his ship, and yet compete with the British ship owner. The magnitude of the home market for all the products of industry in the United States will for many years prevent foreign markets influencing the price of materials that enter into the manufacture of articles that are made here for export, rendering competition possible only during a depressed condition of the home market. A high protective tariff fosters this condition, and will always make it uncertain how far it is possible to compete in foreign markets with those products where the cost of the materials is subject to great fluctuations, as compared with the material used by those with whom we compete.

Competition between the different sections of the United States is quite as complicated a question as between the United States and Great Britain. The vast extent of country between the two seaboards, the great distance of the western edge from the steel-producing section, the difference in wages of from 30 to 40 per cent. between the Atlantic and Pacific coasts, makes the question of being able to compete with the east a problem of far more interest to us in California than any dream we might at times have of competition with England in our line of business. There will be certain kinds of work in which this country will excel other countries, and these products will command attention and sale in the markets of the world, and the number of these products and their volume will increase as their merits become better and more widely known. But I hardly think that English industries will suffer thereby; in fact, they will be stimulated. There are more British manufacturers to be met with now in this country than ever before, studying our methods and eager to adopt anything that promises better results than they now obtain, and this intercourse will lead to improvement both here and there.

Several years ago, British ship builders never thought of visiting the United States to learn anything in ship yard practice. But they come now to see us and what we are doing, even as far as the Pacific coast. We are glad to meet them, and never fail to profit, if possible, by such visits, while there is no doubt that they also learn from us. The competition so far, in my business of building ships, has been in skill rather than in price. It may be a long time before we can underbid the British ship builder; but for those that can afford our price, we can at least equal his best production in quality; and on these terms I hope the British ship yards may have all they can do, and that one particular yard on the far-off shore of the Pacific may never need to underbid them for a contract.

*Engineering of London has been printing for several weeks past articles on this subject from the heads of leading industrial concerns in the United States.

NEW TYPE OF COLLIER LAUNCHED.

Considerable interest attaches to the collier Pleiades, which the Maryland Steel Co. put into the water at Sparrow's Point, Md., last week. A sister vessel, the Hyades, will be launched about a month hence. These are the first vessels of their kind to be built in the United States. At Baltimore local interest in the launch of the Pleiades was due to the fact that she is the largest vessel as yet constructed on Chesapeake bay. These colliers, which are building for the Boston Tow Boat Co., will cost in the neighborhood of $300,000 each. They are of steel, 340 feet in length, 47 feet beam and 27 feet depth of hold, and each will carry about 5,700 tons of coal. The vessels have 8 feet sheer forward and 3 feet sheer aft. Each collier has seven bulkheads, of which six are watertight. The vessels are schooner rigged; each has two steel pole masts and is fitted with hand steering gear; one tank of a capacity of 500 gallons for the crew, two tanks of 3,000 gallons each in the engine room, and two hand fire pumps. Each vessel is fitted with triple expansion engines with cylinders of 21, 35 and 56 inches diameter and 42 inches stroke of piston. A working pressure of 170 pounds and a piston speed of 700 feet per minute is provided for. The high and intermediate pressure cylinders are of the piston type and the low pressure cylinder of the slide valve type. The crank shaft is steel forged in two pieces—the built up type. The two Scotch boilers are each 14 feet in diameter by 10½ feet in length and fitted with Morrison furnaces. Each vessel has a full equipment of Blake pumps and the auxiliary machinery includes four Williamson double drums and a Williamson steerer as well as a steam windlass. Two 20-foot metallic life boats and one 18 foot dingey will be provided for each vessel. The engines, which are capable of developing 1500 indicated horse power, are expected to drive the collier at a speed of 10 knots per hour.

SHIP BUILDING DURING 1899.

Commissioner of Navigation Chamberlain has just completed a summary of statistics relative to ship building operations in the United States during the calendar year 1899. The statistics furnished in the annual report of the commissioner of navigation, and which were summarized in the Review some weeks since, represented operations during the treasury department fiscal year ended June 30, 1899. The figures herewith presented while not as complete as to detail as those just referred to are highly interesting.

The total number of vessels built and officially numbered by the bureau of navigation during the calendar year just ended was 954 of 267,642 gross tons, compared with 955 of 237,600 gross tons for the year 1898. Steam vessels built during 1899 numbered 421 of 160,132 gross tons, compared with 550 of 169,602 gross tons for 1898. Sail vessels numbered 533 of 107,510 gross tons, compared with 405 of 67,998 gross tons for 1898. The increase is largely on the Atlantic and Gulf coasts, where 658 vessels of 163,519 gross tons were built, compared with 538 vessels of 86,005 gross tons for 1898. On the Pacific coast only 114 vessels of 20,087 gross tons were built, compared with 240 of 61,923 gross tons for the previous year. This falling off in construction on the Pacific coast, in spite of the fact that the Alaskan trade next year will be very large, is due partly to the belief that American merchant vessels hitherto employed as transports to Manila will be released, and enter the coasting trade in the spring. Construction on the great lakes comprised seventy vessels of 72,094 gross tons, compared with sixty-six of 75,067 gross tons for 1898; on the Mississippi and western rivers, 112 of 11,942 gross tons, compared with 111 of 14,605 gross tons for 1898.

Of steel steam vessels, almost wholly for the coasting trade, 75,313 gross tons were built on the seaboard and 50,836 gross tons on the great lakes, compared with 39,219 gross tons on the seaboard and 47,410 gross tons on the great lakes for 1898. The construction of 75,313 gross tons of steel steam vessels on the seaboard is the largest output of this description in our history.

For purposes of comparison it may be noted that unofficial figures show that one British ship yard during 1899 built 82,634 gross tons of steel steamships and another built 77,501 gross tons during the year. Eighteen British ship yards during the past year launched each over 30,000 gross tons of steel steamships. The total output for the United Kingdom for the year has not been ascertained, but it will exceed 744 steamships of 1,363,318 gross tons, practically all of which were steel, built during 1898.

The returns for the first six months of the fiscal year (to end June 30, 1900), show the construction in the United States of 527 vessels of 133,487 gross tons, compared with 511 vessels of 130,154 gross tons for the corresponding six months of the previous fiscal year. None of the foregoing figures include unrigged barges and canal boats. Including these, the total documented tonnage built in the United States during the current fiscal year bids fair to be somewhat over 300,000 gross tons.

DEPARTMENT OF COMMERCE.

It is again announced from Washington that the proposition to organize a new department of the government—department of commerce and industry—will undoubtedly be given full consideration with the shipping bill and other measures of interest to vessel owners during the remainder of the present session of congress. Plans for a department of commerce, several times discussed in these columns, have been approved by Senator Frye, the staunch champion of shipping and commercial interests, and by many other leading members of congress, as well as commercial organizations all over the country. It is proposed to give to this new department jurisdiction over the foreign and international commerce of the United States, except in that which relates to the collection of revenue and the administration of customs and internal revenue laws. It shall have charge of matters relating to the manufacturing interests of the country, the extension of foreign markets for the same, and the increase of trade and trade facilities with foreign countries. The following bureaus are taken out of the treasury department and put under the jurisdiction of the department of commerce and industries: the life-saving service, the light-house board, the marine hospital service, the bureau of steamboat inspection, the bureau of navigation, the United States shipping commissioners, the bureau of immigration, the United States coast and geodetic survey and the bureau of statistics; the department of labor is transferred and the bureau of statistics of the state department is transferred and consolidated with the department of labor, and the bureau of statistics of the treasury departments. The consular bureau of the department of state is transferred and consular officers required to report to the secretary of the department of commerce except when they act in a diplomatic capacity.

RECORD FOR THE ST. LOUIS.

The steamer St. Louis of the American line made a notable record during the past year in covering the greatest distance ever traversed in a similar space of time by any production of man's ingenuity propelled by its own motive power. In thirty-four voyages across the Atlantic between Southampton and New York this American-built steamer traveled 106,764½ miles and carried 16,858 passengers, of which number 5,981 were first-class. There may be Pullman cars on transcontinental trains which in constant service have traversed more than 106,000 miles within a year, but no locomotive or other vehicle propelled by its own power has approached the record of the St. Louis. The St. Louis was in commission continuously during all save two weeks and had not a single mishap. The average of the St. Louis for the 365 days in the year is 292 miles. Taking into consideration the fact that the steamer was in port during 133 days it will be seen that her actual average steaming was 460 miles a day.

Plans for the new revenue cutter for service on the great lakes, which was described and illustrated in the naval edition of the Marine Review, have been completed, and advertisements calling for bids will be issued within a few days. No selection of a name for the new vessel has as yet been made.

THE YEAR IN BRITISH SHIP BUILDING.

As was expected, the year 1899 witnessed the surpassing of all previous records by British ship builders. The largest vessel put into the water during the year was the Oceanic of 17,250 gross tons, and indeed her builders, Messrs. Harland & Wolff of Belfast, head the list of ship builders in the aggregate of tonnage turned out. Next to the Oceanic, the largest boat of the year was the Ivernia of 15,512 gross tons, which was constructed by C. S. Swan & Hunter, and the Saxonia of 14,000 gross tons. The following table shows the amount of mercantile and naval tonnage launched at private ship yards in Great Britain during the past twelve months as compared with the output during seven previous years.

Launched in 1899	956	vessels of	1,641,783	tons gross.
" " 1898	794	"	1,488,130	"
" " 1897	635	"	1,016,066	"
" " 1896	743	"	1 257,339	"
" " 1895	630	"	1,028,708	"
" " 1894	637	"	1,052,779	"
" " 1893	545	"	849,881	"
" " 1892	702	"	1,210,657	"

That Great Britain has no intention of allowing her naval prestige to lapse is indicated by the record for warship construction during the year. There were launched for the British navy from five royal dockyards and the various private ship building plants throughout the country a total of nineteen vessels, aggregating 122,322 tons and 196,400 indicated horse power, and which will cost ultimately about $45,000,000. In 1898 the number of vessels was thirty, the tonnage 140,988 and the horse power 253,600. For countries other than Great Britain there were launched during the year sixteen war vessels of 47,170 tons and 124,000 indicated horse power.

CALENDARS WORTH KEEPING.

The Bullock Electric Manufacturing Co. of Cincinnati has issued the January number of its regular monthly calendar. The ornamentation is in colors and the design as artistic as usual.

An admirable calendar for busy men comes from George B. Carpenter & Co. of 202-208 South Water street, Chicago, jobbers of cordage, tackle, blocks, packing twines, cotton duck, etc., and western agents for the Peerless Rubber Manufacturing Co. An adjustable figure of a hand can be made to indicate the date.

A dainty reproduction of a water color embellishes the calendar of M. W. Fogg, 20 Fulton street, New York city, dealer in mattresses, cushions, draperies and upholstery for yachts, steamboats, etc. Yachtsmen will find the calendar especially valuable from the fact that the time of morning high-water at Governor's island is indicated for every day in the year.

Patrons of John Mair & Son, 136 Delaware avenue, Philadelphia, manufacturers of Japan and enamel paints, have been favored with a very suitable memento in the calendar line. Mair & Son's paint is used extensively on yachts and ocean steamers.

A substantial every-day kind of calendar, just the sort which every business man delights to come across, comes to hand from Lane & De Groot, manufacturers of metallic life boats, whose place of business is at 70 and 72 Kent street, Brooklyn, N. Y.

A very excellent calendar and tide table giving the hours of tides at Sandy Hook, Governor's island and Hell Gate Ferry, New York, comes from the Kingsford Foundry & Machine Works of Oswego, N. Y., manufacturers of Kingsford marine boilers, circulating and wrecking pumps, dredging and ballast pumps, etc.

AN ADVANTAGE TO AMERICAN SHIPPING.

It is believed that British Canadian vessels will be virtually driven out of the Alaskan trade by a recent ruling of the United States treasury department. Shipping interests of Seattle and San Francisco have finally induced the treasury officials to revoke an order which went into effect January 29, 1898, and which has ever since been a source of annoyance to American shippers, from the fact that it brought them into competition with British vessels which were permitted to carry merchandise and other cargo sent in bond from Seattle and other American ports to Vancouver, and thence shipped to Alaskan ports, notably Lynn canal points, St. Michael and Cape Nome. The revocation of this order will, it is said, make it unprofitable for British vessels to engage in the Cape Nome trade.

Some very interesting comments are accredited to Mr. Charles H. Cramp, the well known ship builder, in a recent interview relative to the extensive shipping facilities which England is employing in the conduct of the South African war. Mr. Cramp is quoted as saying: "No war in the history of Europe has ever used so much of the great transportation facilities of the ocean. Today England has practically every fast transatlantic liner in the merchant marine service, and the effect will be most marked in the carrying trade of that country. Germany is already securing a profitable foothold in transatlantic navigation and she will maintain it for years to come. A sudden termination of the war would not result in the immediate return of these vessels to their former avocations. Some of them may be lost, others will be used for different purposes and still others will have become obsolete. Germany's merchant marine is assuming large proportions, and her ocean carrying trade is increasing rapidly. She will leave no stone unturned to take advantage of the present situation, which will prove beneficial to her interests."

A rather interesting communication recently given out by Mr. C. J. Leyland of the Parsons Marine Steam Turbine Co. of England, is as follows: "Permit me on behalf of the Parsons Marine Steam Turbine Co. to correct the account which has appeared in several papers of the preliminary run of the torpedo boat destroyer Viper. She has only been out once, and not at full power. About 32 knots was realized, which, considering wind and swell, was satisfactory. Her contract speed is 31 knots, not 35, though she has been designed to considerably exceed the contract. She proved herself a good seaboat, but if she had been buried in the seas at such speed no one would have been left on deck."

THE NEW BATTLESHIPS.

DESIGNS ALL BUT COMPLETED FOR THE THREE GREATEST WAR VESSELS EVER PROJECTED FOR THE AMERICAN NAVY—ARMOR TESTS.

WASHINGTON OFFICE MARINE REVIEW, 1345 PENNSYLVANIA AVE, WASHINGTON, Jan. 3, 1900.

In a general way the designs for the three greatest battleships ever projected for the American navy have been agreed upon by the naval board of construction after several months of discussion over the important questions of battery, armor, speed, coal capacity and displacement. The three new vessels—to be called the Georgia, the New Jersey and the Pennsylvania—will equal in formidability the finest line of battleships yet laid down by any foreign power, and with the addition of typical American improvements, will surpass in fighting force any ships now afloat. The salient features of the design contemplate a displacement of approximately 14,000 tons as compared with the Oregon's 11,000 or the new Maine's 12,300. The speed is to be at least 19 knots, with a coal bunker capacity of 2,000 tons. There will be two superimposed turrets—one fore and the other aft—each containing two 12-inch and two 8-inch guns of the new elongated bore and high smokeless powder velocity. The remaining guns of the main battery will consist of twelve 6-inch quickfire in broadside. This arrangement of battery has been finally adopted instead of an alternative plan which provided for four 12-inch guns in turrets, and sixteen 6-inch broadsides which had been put forward to avoid the expedient of superimposed turrets. The two-story turrets, which are a distinctively American innovation as applied to the Kearsarge and the Kentucky are regarded as no longer of doubtful success. It is known that foreign governments are preparing to adopt them to secure the concentration and angle of fire. The board also definitely determined upon the use of the most modern Kruppized armor for the new vessels, its precise distribution to be decided upon after the chief constructor has made sufficient progress with the actual plans to determine the proper arrangement of weights. The armor problem has been the most difficult to solve, and to this cause is attributed the delay in planning the ships. The act authorizing the vessels was approved on March 3 of this year and it stipulated that no contract should be made for any portion of the vessels until a contract was made for the armor. As the weight of armor entering into these ships was a very large item, the question of the adoption of Krupp or the Harveyized material was extremely important. This can be readily appreciated from the fact that roughly 3,000 tons of the former (the approximate weight required for each battleship) is equivalent as regards resistance to penetration to 4,000 of the latter. The adoption, therefore, of the material treated by the Krupp process meant that 1,000 tons of weight would be available for distribution among other vital characteristics of a battleship—weight of propelling machinery, speed, armament, coal carrying capacity and draught. The total cost of each of these three ships when ready for sea will exceed $7,000,000 each. They will cruise 7,000 miles straightaway, and there will not be three ships of similar offensive and defensive strength in the fleet of any possible enemy.

In the presence of officials of the Russian government, United States naval officers, and representatives of the Carnegie Steel company, an 8-inch Krupp plate, a part of a lot of armor intended for the Russian battleship Retvisan, now building at the Cramps Ship yards, Philadelphia, was tested today at the Indian Head proving grounds. The plate was 190 inches long, 93 inches wide and 8 inches thick, and curved. The gun used in making the test was an 8-inch rifle, the projectiles being armor piercing shells 250 pounds each in weight. The required striking velocity was 1,780 feet per second. Four shots were fired at the corners of a 28-inch square, drawn in the center of the plate. The striking velocity was 1,837 feet per second for the first shot, 1,791 for the second, 1,815 for the third and 1,834 for the fourth. The penetration attained by the shells ranged from 1½ to 2⅝ inches. The plate did not crack under the test and was very little injured. The test was regarded by those present as entirely satisfactory.

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Preliminary arrangements are now being made for placing the battleships Kearsarge and Kentucky in commission within the next few weeks. It is quite likely that the Kearsarge will be placed in commission at the Norfolk navy yard and the Kentucky at the New York yard. The enlisted force for these vessels is now being made up in the bureau of navigation. Capt. W. M. Folger will command the Kearsarge and Capt. C. M. Chester will command the Kentucky. Lieutenant Commander G. A. Merriam will be the executive officer of the Kearsarge, and Lieut. Emile Theiss will have charge of her engines. Lieutenant Commander Karl Rohrer will be the executive officer of the Kentucky, and Lieutenant Martin Bevington will have charge of the engineer department of that vessel.

* * *

The secretary of the navy has arranged for the sale of the collier Scipio to Ludwig Rubelli of Philadelphia, at $41,550, and for the sale of the naval tug Rocket to James Tregarther & Son of New York, at $1,123. The purchaser in each case made the highest bid received for these vessels which were recently condemned for naval service.

* * *

Capt. Peter A. Rearick of the engineer corps of the navy, will be placed on the retired list February 17 next, with the rank of rear admiral of the junior grade, in accordance with the provisions of the personnel law authorizing such advancement in the case of officers who served in the war of the rebellion. Admiral Rearick was born in Washington and entered the navy in 1860. He made an excellent record as an engineer officer, and was prominently identified with the construction of many of the new battleships, including the Kearsarge, Kentucky and Illinois.

* * *

None of the officers of the highest grade in the navy will retire on account of age during the last year of the nineteenth century. This is somewhat unprecedented as it is usual for from one to four rear admirals to reach the retiring age every year. The next rear admiral to retire will be Rear Admiral F. V. McNair, the superintendent of the naval academy, who relinquishes active duty January 13, 1901. Admiral McNair is at the head of the list of rear admirals and is second only to Admiral Dewey in lineal rank in the navy. Rear Admiral W. S. Schley also retires during the year 1901. The following is an official list of naval retirements during the year 1900. Pay Director Edward May, Jan. 10; Medical Director Grove S. Beardslee, January 22; Medical Director James M. Flint, February 7; Naval Constructor William H. Varney, April 19; Medical Director Thomas C. Walton, May 31; Commander William C. Gibson, July 23; Chief Sailmaker John C. Herbert, August 11; Medical Director George W. Woods, August 24; Professor Henry D. R. Todd, August 25; Chief Boatswain John B. F. Langton, October 8; Capt. Peter A. Rearick, November 12; Medical Director Charles H. White, November 19; Capt. John Lowe, December 11.

* * *

The serious illness of Representative Boutelle of Maine will cause a recasting of the work of the naval affairs committee of which he is chairman. The naval appropriation bill is now before the committee in the form of the annual estimates submitted and the committee will go to work early in January to frame the bill. This is a task of some magnitude, requiring frequent hearings of bureau officers and also the adoption of a definite policy concerning the increase of the navy in extent and character. Mr. Foss of Illinois is the ranking member of the committee and will have charge of the bill.

LIGHT DRAUGHT GUNBOATS DISABLED.

The Helena and the Wilmington, twin vessels of the light draught gunboat type, and generally regarded as the most useful all around craft in the United States naval service, have been for some time practically useless, one at Manila and the other at Buenos Ayres. They were built together three years ago, and both are now disabled with broken shafts. They are twin screw vessels, and even with one engine motionless can make more or less headway with their remaining power. It is recalled, in this connection, that some twin-screw ships have made long cruises working only one shaft and proceeding with a somewhat crablike motion, as was the case with Dewey's flagship, the Olympia, on her memorable voyage home to New York last fall. The affair was kept secret at the time for fear of the unfavorable effect it might have had in the European ports which she visited, and because Admiral Dewey never thought the matter of sufficient importance to report to the navy department. It was a fact, however, that in her passage through the Suez canal, which was made at night to avoid possible plague contamination from bumboats, which would have swarmed around the ship in daylight, the Olympia bent her port propeller until it was worthless as a means of propulsion.

From that day to this the Olympia has cruised 5,000 knots on one screw. Part of the time in the Mediterranean both engines were kept going, but before reaching Gibraltar the engineers discovered that the port engine was accomplishing nothing, that the ship was making as much speed and burning less coal without it, so it was disconnected and has not been used since. Yet no one suspected last October at the naval parade that the great ship was at best half disabled and that her maximum speed was only nine knots. The breaking of the shafts of the Helena and the Wilmington is attributed to the desire of the designers to save all possible weight in these vessels to enable them to ascend the shallowest rivers and cruise generally where other vessels of their offensive powers were prohibited by their deeper draught. On this account they were equipped with tubular shafts, the cores being bored out for the entire length. Theoretically little strength is sacrificed, with enormous saving in weight, but in practice it was found that the contractors for the vessels did not bore the long holes perfectly concentric with the outside diameter, resulting in weakened spots, undiscovered until the fracture occurred. The navy department has undertaken to supply solid shafts of higher grade material, and two of these for the Wilmington will be completed at the New York navy yard next week and will be sent out to the South American station by merchant steamer early in January. Two more will go to the Helena by similar carriers in February. It is not known how the Helena broke down, but the Wilmington's shaft cracked just outside the hull on the way to Rio, where temporary repairs were made which enabled her to reach Buenos Ayres.

COMMERCE OF OUR NEW POSSESSIONS.

Commerce with Cuba, Puerto Rico, and the Hawaiian, Philippine and Samoan islands during the eleven months ending with November fully justifies the belief that the new relations which those islands sustain to the United States will result in a great increase in our commerce with them and especially in an increase of our exports to them. The total exports from the United States to the four islands or groups of islands will amount in the calendar year 1899 to considerably more than $40,000,000, the total for the eleven months ending with November being $37,854,110, as compared with less than $20,000,000 last year. When it is considered that neither Cuba nor Puerto Rico has yet returned to anything like normal conditions, and that there has been a condition of actual warfare in the Philippines during the year, the fact that the total exports to the islands in the year exceed those of the palmiest days of reciprocity, shows that when normal conditions return, our exports to the islands will greatly increase over those of earlier years. Our total exports to Cuba, Puerto Rico, Hawaii, and the Philippine Islands in the years of their greatest prosperity under the reciprocity relations of 1893 and 1894 amounted to but about 33 million dollars, while, as already indicated, those of 1899 will be considerable in excess of 40 million dollars, the total for the month of November having been over 4 million dollars.

The steamer to be used by the German Antarctic expedition is well on the way to completion at Kiel. The vessel is constructed entirely of wood and the middle deck is approximately on a level with the water line in order to strengthen the ship against ice pressure. A triple coating of oak, pitch pine and South American greenwood will be put on as a protection against floating ice. The craft will be rigged as a three-masted schooner and will be lighted by electricity.

AROUND THE GREAT LAKES.

A third quarterly dividend of 1¾ per cent on preferred stock of the American Ship Building Co. has been declared, payable January 15.

Jerry McCarthy of Buffalo, has purchased the schooner George H. Warmington for $6,500 and will put her in the lumber trade. The Warmington was built by Nichols at Vermillion in 1872 and has been a member of the Minch fleet.

Mr. Douglas Brews has been appointed chief engineer of the Mutual and Menominee lines of steamers and will have his office with Capt. George P. McKay, manager of the boats in the Perry-Payne building, Cleveland. Mr. Brews has been associated at different times with the Cleveland & Buffalo Transit Co., the Globe Iron Works Co., and the Cleveland Ship Building Co.

The fleet of vessels in winter quarters exceeds in size that of any previous year. It consists of seventy-five steamers and twenty-four schooners, a total of ninety-nine boats. If all the vessels laid up would take coal cargoes next spring they would take to upper lake ports something like 237,000 tons. Many of the vessels still have cargoes of grain, ore and lumber aboard.

At the annual meeting of the Detroit lodge of the Shipmasters' association the former officers were re-elected as follows: A. J. McKay, president, for the fifth consecutive term; William Roach, first vice president; James Watts, second vice president; Hiram Still, treasurer; William H. Hoffman, secretary; Charles M. McIntosh, chaplain; James Beauvais, marshal; William McLane, warden; George C. Burns, sentinel; D. Wilson, trustee for three years; A. J. McKay, delegate to grand lodge; William Roach, alternate.

It was stated at the annual meeting of Cleveland lodge of the Shipmasters' association that during the past year twenty members were elected to membership, making the total 174. Only one member was lost by death during the year. The following officers were elected: President, Capt. Ralph E. Byrnes; first vice president, Capt. William Ames; second vice president, Capt. Samuel Allen; financial secretary, Capt. O. Olsen; recording secretary, Capt. C. S. Allen. Capt. Ralph E. Byrnes was elected delegate and Capt. Carlton Graves alternate to the grand lodge meeting, which will be held at Buffalo the last Tuesday in January.

The Craig Ship Building Co. of Toledo, has closed a contract with J. L. Crosthwaite of Buffalo, and others, for a Welland canal-sized steel steamer. She will be 258 feet over all, 48 feet beam and 18¼ feet deep. The vessel will be fitted with triple expansion engines to which steam will be furnished from two Scotch boilers each 12½ feet in diameter by 12 feet in length. She will be a single deck vessel and will be completed about the middle of July, and will be taken direct to the coast, where she will engage in the lumber trade between Atlantic ports. The same parties asked for bids for two vessels, and it is probable that the Craig company will secure the contract for the other vessel also.

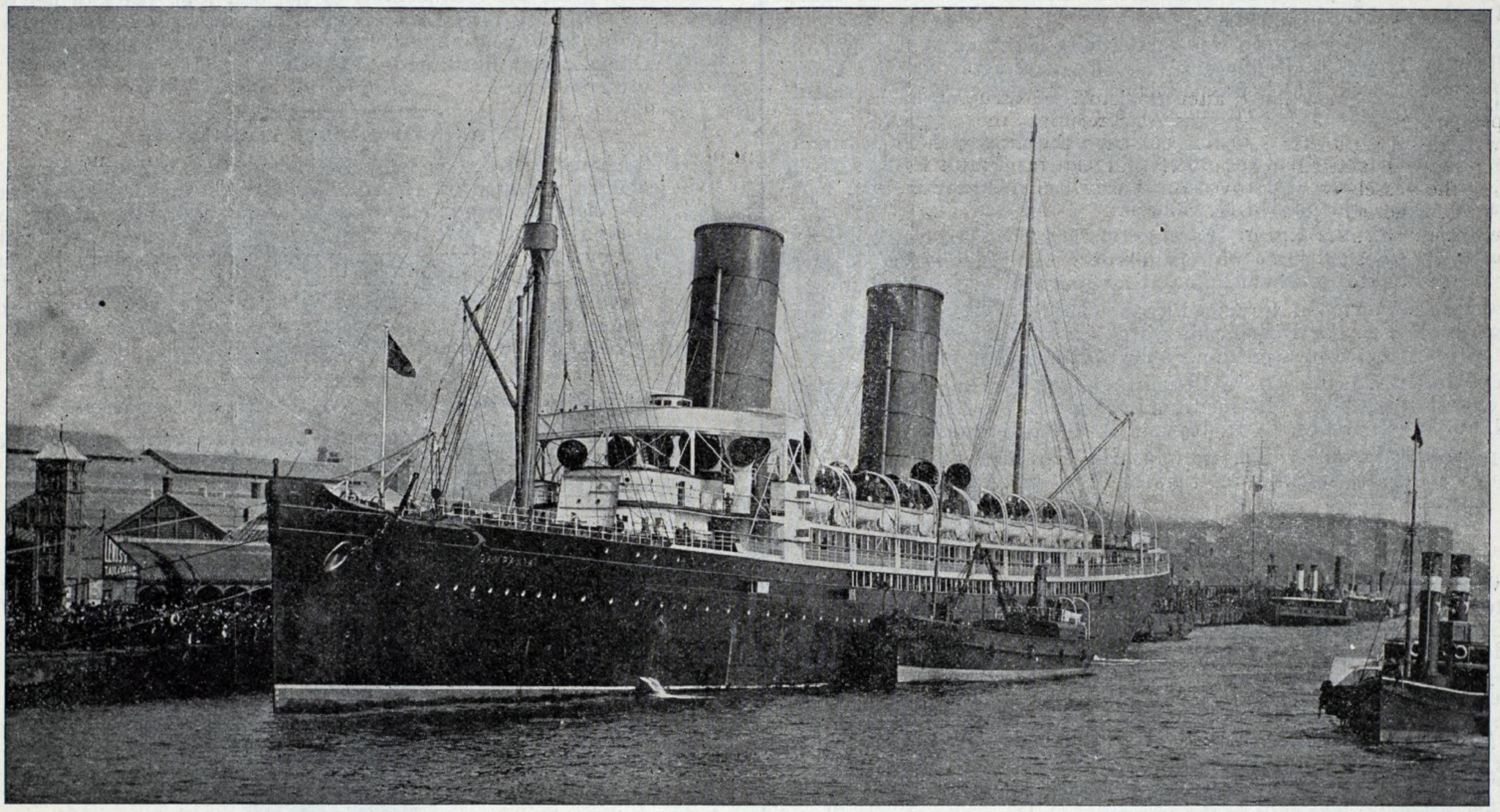
The regular weekly report of new vessels issued by the bureau of navigation, treasury department, lists the schooner Marion Chappell, recently completed at Noank, Conn., as of 1,595 gross or 1,484 net tons, and the schooner Drifton, just completed at Perth Amboy, N. Y., as of 495 gross or 492 net tons. The tug Edward Luckenbach a late Philadelphia product, is 401 gross or 198 net tons and the tug Savage, recently turned out by the Columbian Iron Works, Baltimore, Md., is of 410 gross or 279 net tons.

FLOATING LANDING STAGE AT LIVERPOOL, ENGLAND.

BY JAS. J. SALMOND.

To those of our readers who are not already aware of the fact it may come with a little surprise when they are told that at many of the British seaports the tides rise to much greater heights than is usual at American ports. At Liverpool, England, for instance, the tide has an average rise of about 20 feet, while at New York it is about 6 feet. This unusual height of tides calls for an entirely new means of overcoming the inconveniences caused by them, and for one not acquainted with conditions as they really exist at the port of Liverpool, to which we especially refer at this time, it would be highly interesting to spend the time necessary to go around her docks and learn how man's inventive genius has been at work in order to make Liverpool capable of harboring vast numbers of ships in spite of the fact that her position, the nature of the River Mersey and many other things were directly against her.

One great obstacle with which Liverpool had to grapple was the existence of a number of sand banks at the mouth of the river, which made it impossible for steamers having large draught to get into port except at high tide. This caused great loss of time, both to passengers and mails. The dock board had special dredges constructed and by constant dredging this trouble was removed, but then it was found that further up the river and directly opposite the city where naturally passengers wished to be put ashore, it was not possible to bring great numbers of ocean liners, which constantly come and go alongside a wharf, as is possible in New York, for instance, for should one of them get alongside and the tide should then recede there was not sufficient depth to permit the vessel to float, to say nothing of the inconvenience which would result in the handling of passengers and baggage as the tide began to either recede or rise while the wharf itself remained stationary. This somewhat vexing feature is fully met, however, by the use of an immense floating landing stage, picture of which is given herewith showing the Cunard liner Campania ready to sail for New York.



VIEW OF LANDING STAGE FOR EXPRESS STEAMERS AT LIVERPOOL—CUNARD LINER CAMPANIA LEAVING PORT.

This floating landing place is about 2,060 feet long and 80 feet wide, and of course it is an easy matter to add to it should it be found necessary. The upper part of the structure is built of wood and rests upon immense pontoons, which are held to the mainland by means of immense cables, as Liverpool is visited by some severe storms and it is considered best and wisest to have this floating stage securely anchored. In addition to these cables this float (which resembles a large car float) is held to the mainland by seven steel bridges, which are made free to act at the end which touches the mainland. These bridges are used for pedestrians and teams as well as acting as anchor bolts.

The great feature of this stage, however, is that as the tide recedes the stage also recedes and the distance from its surface to the decks of the many vessels which come alongside to receive freight and passengers is therefore always the same, thus overcoming the great inconvenience otherwise bound to follow. This is only one of the many ways in which Liverpool has had to adopt unique methods in order to maintain her position in the shipping world.

Two libels have been filed in the United States district court at Boston against the Boutelle transportation and towing company by the Metropolitan coal company and the Chesapeake & Ohio coal agency company. The transportation concern owns a fleet of tugs and barges brought from the great lakes to ply in the coal trade, and both libels allege failure to fulfil contracts. Attachments were placed on the tug Sweepstakes and barges Wadena, Wm. D. Becker and Annie M. Ash at the instance of the Metropolitan coal company, and the vessels were released by the towing company filing a bond in the sum of $50,000.

SUMMARY OF SHIP YARD OPERATIONS.

The handsome five-masted schooner Jennie French Potter, recently launched from the yard of H. M. Bean, Camden, Me., will engage in the coal trade and will be commanded by Capt. J. R. Potter of Orient, Long Island, N. Y. Frames of this vessel are of solid oak. Her five masts are of Oregon pine, each 110 feet in length. She has three houses on deck, the forward one 24 by 20 feet, the amidships 18 by 15 feet and the after house 29 by 32 feet. Her anchors, weighing 5,000 pounds, were made at the works of William G. Alden, Camden, N. J. This schooner is 279 feet over all, 240 feet keel, 44 feet beam and 27 feet depth. H. M. Bean has now on the stocks a four-masted schooner for Capt. Bailey of New Jersey that will be launched in March, and he will at an early date lay the keel of the six-masted schooner for Capt. J. G. Crowley. It is expected that this vessel, about which so much has been written, will be launched in July, 1900.

George E. Currier & Son of Newburyport, Mass., have launched the steam lighter Jonas H. French, building for the Cape Ann Granite Co. to replace the steamer George A. Chafee, which was wrecked last November. The vessel is 100 feet in length, 30 feet beam and 7 feet depth. She is fitted with a 200-horse-power engine with 24 inches diameter of cylinder and 2 feet stroke, steam to which is supplied from an Almy water tube boiler. The engine was built by Charles R. Sargent of Newburyport, Mass., and the forging for the shaft was made at the Cape Ann Anchor Works at Gloucester, Mass.

Another large steel sailing ship will very probably be constructed during the coming year at the yard of Arthur Sewall & Co., Bath, Me. Mr. William D. Sewall said, a few days ago, that the chances are that a steel ship larger than any yet constructed for the Sewall fleet will be commenced at the yard in the spring.

The torpedo boat Stockton was successfully launched at the yard of the William R. Trigg Co., Richmond, Va., a few days ago. She is a sister vessel of the Shubrick, which was launched in the presence of President McKinley at the Trigg works late in October last.

At a meeting of directors of the Portsmouth, Kittery & York Street Railway Co., held recently at the office of Treasurer Frank E. Rowell at Kittery, Me., it was decided to contract for the construction of a new ferryboat to replace the burned Newmarch.

The Pusey & Jones Co. of Wilmington, Del., has recently been favored with an unusual share of repair work. At present the steamer Chester of the Chester & Philadelphia Steamboat Co., is being rebuilt.

A compressed air plant, furnished by the Chester Pneumatic Tool Co., is being installed at the Roach ship yard, Chester, Pa. The air compressor will be located in a portion of the old mold loft building.

The Belmont Towing Co. of Bellaire, O., was recently incorporated with a capital of $20,000. The incorporators are S. Steward, W. C. McFarland, W. W. Lawrence, L. M. Joy and R. T. McGowan.

Ship yards at Scranton, La., are unusually crowded with work. One yard now has on the stocks three tugs of 70, 90 and 105 feet length for Mobile parties.

DOWN DRAFT FORGES.

A very neat brochure from the Buffalo Forge Co., Buffalo, N. Y., illustrates and describes a number of new types of down draft forges recently brought out by that company to meet special requirements. The demand for these forges is so great that this department of the Buffalo company's works is taxed to its utmost to keep pace with orders. A type of forge known as No. 02D is adapted especially to moderate work in carriage, wagon and training school 'smith shops. It was originally designed for training school purposes. For moderate work this forge is perhaps better adapted than any other type. For heavier work there is another type, 09D, which is suited for all classes of 'smith shops. The largest and heaviest forge built by the company, O D, is also clearly illustrated in the pamphlet. It is constructed entirely of cast iron and designed for the heaviest work ever performed in a blacksmith shop. Two other forges of steel plate construction, known as No. 07 and 07 T, find wide sale in places where cast iron forms do not apply. Still another form is a down draft stationary blast heating forge. The highly injurious fumes from hot coal, coke and furnace fires, which imperil the health of operators, are readily eliminated with this system. The Buffalo down draft system was not applied to the heating furnace at as early a date as to the forges, but it is so highly efficient that the company is now having a demand unprecedented for these applications.

These down draft forges and furnaces are a new departure in smoke removing. Smoke and gases are drawn away immediately on being generated. There is no escape from the largest and heaviest fires. This is accomplished by down draft suction through underground tile pipes. No overhead piping systems or inefficient telescopic hoods obstruct valuable space and light. Hoods are adjustable to different positions at the fire, according to conditions. The forge shop atmosphere is thus kept pure as the best ventilated machine rooms, and the temperature materially reduced in summer. The forges are practically indestructible and the first cost moderate. With them there is no further expense—overhead galvanized iron piping is subject to frequent renewal. These forges were patented Nov. 29, 1894.

Ludwig Rubelli of Philadelphia was the highest bidder for the foreign-built collier Scipio, which was purchased by the navy for use during the war with Spain and which is now to be sold. Rubelli offered for the boat $21,550. Bids for the purchase of the naval steam launch Rocket were opened at the same time. Carrie F. Hall, whose address is Aqueduct avenue and 182nd street, New York city, was the highest bidder, at $1,300.

The channel of the St. Lawrence river between Montreal and Quebec is being dredged to a depth of 29 feet. The commerce of the port of Montreal sustained a considerable decline during the past year. Only 801 sea-going vessels made the port as against 868 during the previous year.

BOOKS OF THE HOUR.

A book dealing with the subject of the merchant marine that has literally perennial popularity is "American Steam Vessels," by Samuel Ward Stanton. The volume is designed to bring into compact form correct illustrations and descriptions of the various types of American steam vessels from the beginning of their successful construction up to the present day, and certainly this has been most admirably accomplished. It has been the aim to use, wherever possible, the most famous and historical American steamers, as illustrative of the various types in all parts of the country. The pictures presented have been drawn from reliable sources—from early prints, lithographs, drawings and paintings, mostly in the possession of private parties or steamboat companies—and those of later days from photographs, plans, sketches, etc. Upward of three hundred vessels are illustrated and described, several different illustrations being given in the case of some of the vessels. The pages of the work are handsomely illuminated and the volume may be truthfully said to rank quite as high from an artistic standpoint as it does as an authority relative to vessels. "American Steam Vessels" is published by S. W. Stanton of 129 Broad street, New York city, from whom particulars may be obtained.

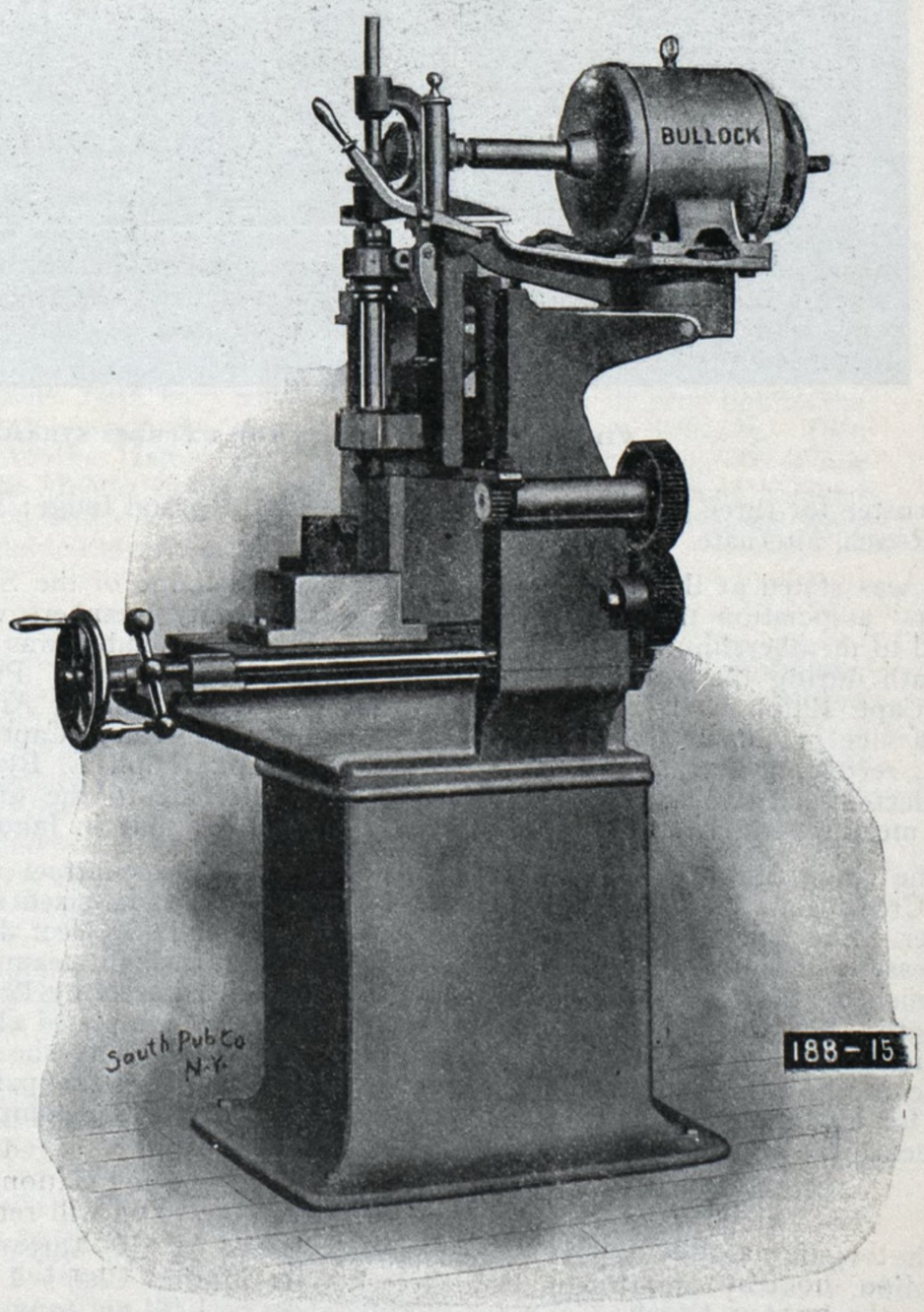
Frank T. Bullen is one of the few authors of sea stories whose tales have been accepted by sea-faring men as being at once interesting and authentic pictures. His "Cruise of the Cachalot" and "Idylls of the Sea" met with favor at the hands of men of all classes in naval and mercantile marine service and it is certain that a similar reception awaits "The Log of a Sea-Waif," which has just come from press. In this new volume, Mr. Bullen gives the recollections of the first four years of his sea life, and a very thrilling recital they form. The author was for fifteen years aboard ship, serving in almost every capacity save that of master. The book is handsomely illustrated. Published by D. Appleton & Co., New York; price $1.50.

VIEWS OF LARGE FORGINGS.

Bethlehem Steel Co. of South Bethlehem, Pa., is distributing a handsome calendar mounted on a card about 12 x 18 inches, with an engraving at the head showing one of their heavy hydraulic forging presses working up a hollow shaft from an ingot of fluid compressed steel. On the twelve monthly sheets appear photogravures of representative forgings produced at the Bethlehem plant, the whole being very effective. The calendars have been sent to the company's correspondents and customers, but we are informed that an application to one of their offices will secure a copy for those who have not already received one.

NEW APPLICATION OF ELECTRIC POWER.

It is a difficult matter to directly apply an electric motor to a profiler without intermediate belting, owing to the fact that the distance between motor and spindle varies by reason of the constant shifting of the carriage.



To surmount the difficulty of a constantly changing length of shaft, the Bullock Electric Mfg. Co. places the motor upon a revolving base and connects the motor and spindle by a splined shaft and sleeve. The shaft sliding within the sleeve allows for the variable distance between motor and spindle. The motor is described in Bulletin No. 4735, which may be had by addressing the company at Cincinnati.

THE PAGAN ADJUSTABLE PROPELLER.

The accompanying engravings show the Pagan propeller, which is being placed on the market by Bougher & Evans, Pier 45, North Delaware avenue, Philadelphia. It is designed principally for use on tug boats and small steamers, and has been in use on the steamers S. H. Hartman and Belle Miller, and the tug Minerva, sailing from the port of Philadelphia, for over two years, without removal for any purpose. These vessels trade constantly in shoal water and through the canals, subjecting their propellers to very severe tests. As will be seen, the propeller is composed of six distinct and separate parts, comprising four blades, and inner and outer flanges. This construction presents several advantages over a solid propeller. With a solid wheel it is said to be never possible for the boat builder to calculate the exact number of turns the engine should make, and in case the pitch of the blades is too sharp the boat labors under great disadvantage until the wheel is broken or discarded and another design guessed at. In the new wheel the base of each blade forms a portion of the hub, and seats itself in a concaved or saucer shaped joint, and allows of the pitch of the blades being adjusted 3 or 4 degrees coarser or finer from a given point. Any adjustment of the blades is easily made, a complete change of pitch being effected inside of 30 minutes. The pitch best suited to the vessel is learned while the propeller is in use, the blades being adjusted or regulated to suit the conditions each time the vessel enters the dry dock, until the most suitable pitch is found. The hollow skeleton hub of this propeller allows a portion of the water churned at the bases of the blades to pass through it instead of forming an impediment. In point of economy the propeller has the usual advantage of section propellers over solid propellers, inasmuch as when a blade is broken it can be easily and quickly replaced with a new one, while a solid wheel under similar circumstances would have to be discarded completely.

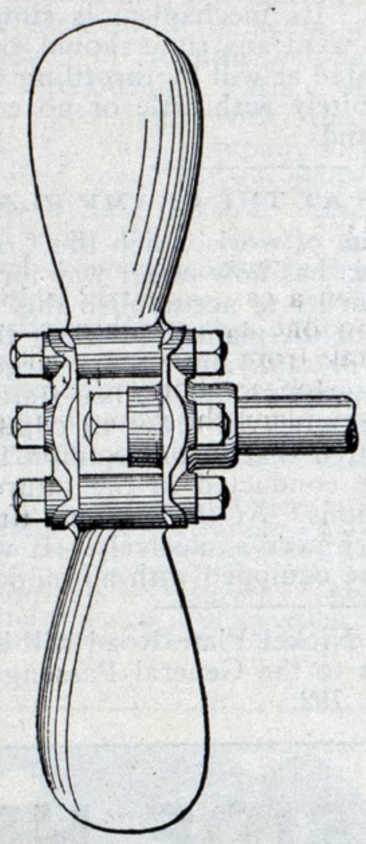


Fig. 2.

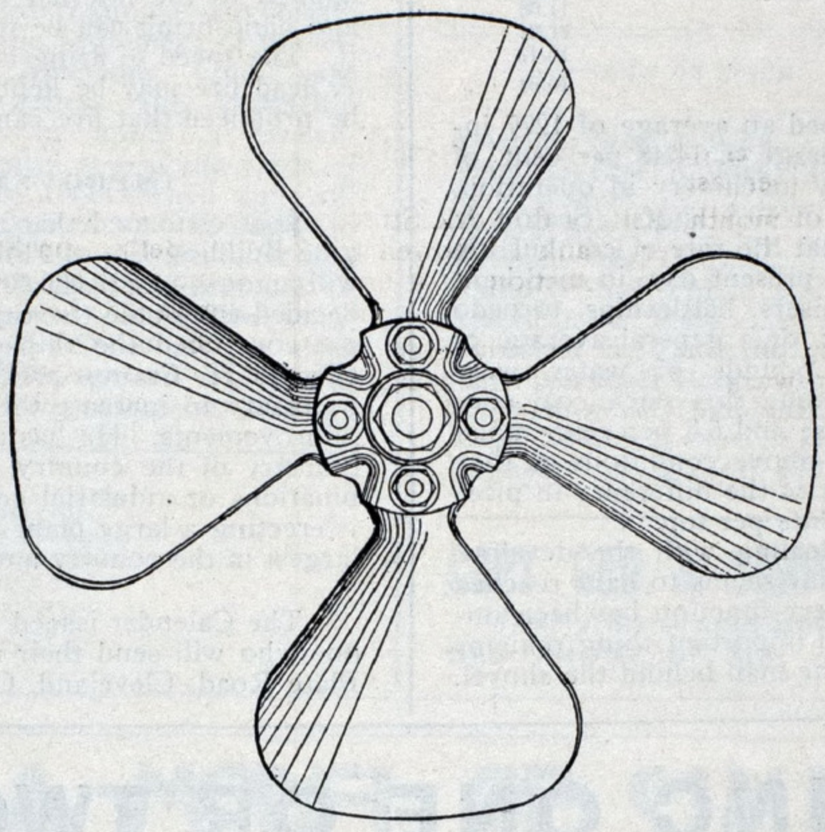
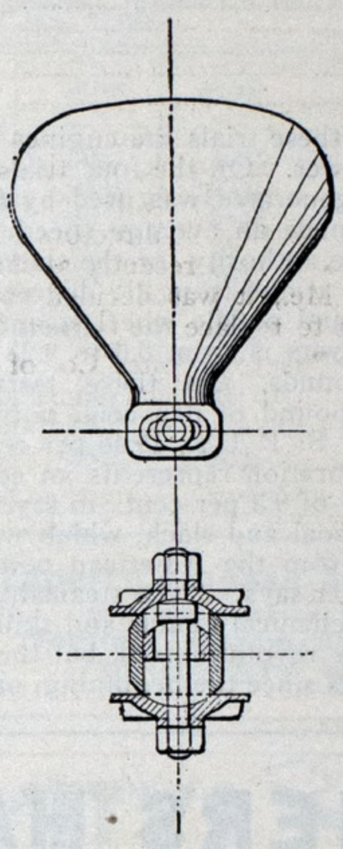


Fig. 1.



Figs 3 and 4.

TYPE OF PATENT SECTIONAL PROPELLER FOR SHALLOW-DRAFT VESSELS.

Referring to the illustrations, Fig. 1 is a rear view of the propeller, showing the blades attached to the hub. Fig. 2 is a side elevation, showing the openings between the hubs of the blades. The blades are shown in a central position, but may be adjusted to a smaller or greater pitch, as desired, the angle of the blade being adjustable through an angle of 30 degrees. Fig. 3 is a plan view of one of the blades, and shows the adjustment feature; and Fig. 4 is a bottom view of the blade, showing the method of clamping. In placing the propeller in position on a shaft the front section of the hub is first fitted and then keyed to the shaft. A blade is then placed in position and the bolt passed through and fastened. The other blades are attached in order, and the after or rear section put on. The adjustment of the blades to a suitable pitch follows, and, this effected, the bolts are tightened and the propeller is ready for service.

NOT FAVORABLE TO COMBINATIONS.

Upon his attention being called to an article in a recent issue of the Review regarding the effort to form a combination of the manufacturers of steam pipe and boiler coverings, as well as the manufacturers of asbestos materials, Dr. Richard V. Mattison, president of the Keasbey & Mattison Co., the largest concern of this kind in the United States, said:

"On general principles we are altogether opposed to these various combinations. They have their fundamental principle for the purpose of acting in restraint of trade, and while we are opposed to undue competition, nevertheless, we feel that the welfare of the nation is best conserved by free, open competition among all manufacturers, as this brings to the front the best brain element of the different persons engaged in the business, and in that way creates, or at least lays the foundation for a more active, wide-awake, enterprising business nation. You will remember that the stigma of commercialism was attached to this nation before we began to shoot in the late unpleasantness with Spain, but after the men behind the guns got to work they thought we were all right commercially, and we were all right in other lines also."

His many friends in marine circles will be pleased to learn that Mr. E. M. Richardson, manager of the marine and street railway department of the Sherwin-Williams Paint Co. of Cleveland, has been made a director of the company.

THE GRECIAN--FREIGHT AND PASSENGER STEAMER.

The launch of the steamer Grecian of the Windsor line, which had been set for last Saturday at the yard of the Harlan & Hollingsworth Co. at Wilmington, Del., had to be postponed by reason of the fact that the ship stuck on the ways. When the blocks were sawed away the vessel started down and was christened in due style but the hull moved only about 18 inches and then stuck. An investigation showed that the tallow on the ways had frozen and caked, and when the vessel started to move, the grease dropped from the ways and the steamer rested on the timbers without the tallow. Jacks were used in an attempt to start the ship again, but every effort failed, and after an hour's hard work it was decided to abandon the task. The vessel was then made fast, shored and blocked up and the launching deferred until such time as the difficulties encountered may be removed, which will probably require only a few days.

The Grecian is the fourth ship built at the works of the Harlan & Hollingsworth Co. for the Boston & Philadelphia Steamship Co., generally known as the Winsor line (others were the Indian, Spartan and Parthian), and is the eighth ship turned out by that company during the year 1899. She is a three-deck freight and passenger steamer, built to rate under the United States Standard Register for seventeen years. Her gross tonnage is 2,483.08; length over all, 290 feet; between perpendiculars, 263 feet 2½ inches; beam, moulded, 42 feet; depth, 36 feet; draught, loaded, 18 to 20 feet; capacity, about 2,500 tons. In the vessel are four watertight bulkheads; four hatches; four side ports on each side; four single-cylinder Williamson winches; Hyde steam windlass capstan forward and aft; two steel masts and a steel deck house with accommodations for about 100 passengers. There are two electric light plants of 200 lights each and an 18-inch search light.

Engines are of the inverted triple expansion type with cylinders of 25, 41½ and 68 inches diameter by 42 inches stroke, and the boilers (four cylindrical) are 12x10½ feet, each with two furnaces of 40 inches inside diameter, built to sustain a working pressure of 170 pounds. The cast iron wheel is of 15 feet diameter. Other features of the vessel are: Ellis & Eaves induced draft; bunker capacity, 275 tons; speed of 15¾ knots on eight hours trial; Scotch donkey boiler of 8x10 feet.

In addition to this ship the Harlan & Hollingsworth Co. will launch shortly two steamers for the New York & Baltimore Transportation Co., three tugs for the Pennsylvania Railroad and a large vessel for the Metropolitan Steamship Co. Work on the torpedo boat destroyers Hopkins and Hull is progressing rapidly and their hulls will probably be plated up shortly. The preliminary trials of the Stringham were most successful, she having made without any effort to obtain speed, nearly 25 knots under only two of her four boilers. She has proven a very satisfactory sea boat, handling remarkably easy and making a complete turn with her helm hard over and with scarcely any perceptible heel in 1½ minutes. It is expected she will have her final trial early in January and then be turned over to the government.

There is on the ways for the Metropolitan Steamship Co. a sister ship to the Whitney, to be delivered in the early spring. This vessel is now being rapidly put in frame. In addition the Harlan & Hollingsworth Co. has just delivered eighteen cars to the Seaboard Air Line, several to the Great Falls & Canada Railway, and contracts have just been signed for fifty-one New York Central & Hudson River cars, twenty-two for the Philadelphia & Reading, a number for the Pittsburgh, Lake Erie & Western and for the J. G. Brill Co.

W. J. Arkell, well known head of the publishing house bearing his name, is said to have interested a sufficient number of capitalists to raise a fund of $50,000 for experiments with the corkscrew boat invented by James Gresham of Brooklyn, N. Y. The inventor makes the usual extravagant claims for his freak craft, among them a speed of 50 miles an hour. It is said that the experimental boat is to be constructed at the Newport News ship yard. It will be cylindrical in shape with a serpentine flange like a corkscrew extending from bow to stern, and the outer shell revolves through the water while the inner compartment maintains its equipoise. The boat is not intended for passenger service but simply for the conveyance of mails and fast freight and for use at life saving stations.

SUCCESSFUL APPLICATION OF MECHANICAL STOKERS.

Reference has been made in the columns several times during the past year to the determined efforts of the American Stoker Co. of 145 Broadway, New York, to successfully apply a special type of marine stoker to the big freighters of the great lakes, which are now being equipped in nearly all cases with quadruple expansion engines and water tube boilers. The New York company's success during the past season of navigation with a mechanical stoker on the steamer Pennsylvania, an ore carrier of about 8,000 tons capacity operated by Pickands, Mather & Co. of Cleveland, has led to the announcement that they are now prepared to under take the equipment of vessels of all kinds with this special device. It may be of interest to note briefly a few results of tests of the stoker on the Pennsylvania, made by order of the bureau of steam engineering, navy department, by Lieutenants B. C. Bryan and W. W. White of the navy. A full report of the tests was published in the August (1899) number of the Journal of the American Society of Naval Engineers. Each of two boilers on the Pennsylvania contained 3,000 square feet of heating surface; allowing 10 square feet per horse power, gives 300 each, or 600 in all. They were built to carry a gauge pressure of 250 pounds. The following table is taken from four tests. The coal used was a cheap slack containing 11,790 B. T. U. per pound of dry coal by a Mahler bomb calorimeter test.

RATES OF COMBUSTION.

	Evaporation from and at 212 degrees. Pounds of water per pound of fuel.	
Trials.	Dry Coal.	Combustible.
First	9.24	10.96
Second	8.97	11.03
Third	8.85	11.32
Fourth	8 21	10.47
Average	8.82	10.94

On three of these trials the engines developed an average of 1277 indicated horse power. On the four trials an average of 14.48 per cent. of the total steam generated was used by auxiliary machinery in operation, and the vessel made an average speed loaded of 10.8 knots. Seaton & Roundthwaite are authority for the statement that the rate of combustion and evaporation, at and from 212 degrees at the present day, in merchant passenger, mail and paddle wheel steamers, cruisers, battleships, torpedo boats and destroyers is from 6.6 to 9.25 pounds, or a general average of less than 8 pounds. On these tests 8.82 pounds of water were evaporated per pound of dry coal, notwithstanding this slack coal contained but 11,790 B. T. U's., 19.46 per cent. refuse and 3.3 per cent. moisture. This evaporation represents an economy above conditions as they generally prevail of 9.3 per cent., to say nothing of the difference in price of run-of-mine coal and slack, which was 60 cents per ton.

A circular from the American company dealing with the development of this stoker says: "The steamship of today seems to have reached the zenith of mechanical genius and skill; its every function has been improved or wholly revolutionized, but the one all important thing remains the same, and has since the beginning, namely the man behind the shovel. He is the uncertain quantity; there is 25 per cent. difference in his work. He is indifferent to all except one thing, the steam pressure carried. The dollars and cents that he unnecessarily shovels in the furnace concern him little. The purpose of the American underfeed stoker is to perfect the introduction of coal to the furnace. It feeds the coal to the fire from underneath, and may be considered a gas producer and burner combined. The coal is fed into the hopper, carried by the conveyor into the magazine, which it fills, overflows on both sides, and spreads upon the sides of the grates. The coal is fed slowly and continuously, and, approaching the fire in its upward course, it is slowly roasted and coked, and the gases released from it are taken up by the fresh air entering through the tuyeres, which explodes these gases and delivers the coal as coke on the grates above. The continuous feeding gives a breathing motion to this coke bed, thus keeping it open and free for the circulation of air. Particular attention is called to the fact that every pound of coal fed into the hoppers passes through this gas-making process, and there is no loss of coal through grates, by reason of the use of dead grates in the furnace, in place of open grate bars. The non-combustible is taken from the furnace in the shape of vitrified clinker. There is practically no soot, and with these results it is obvious that the combustion must be extraordinarily good. Lump coal is, of course, handled as well as the finest slack, as any lump that can be fed into the hoppers will be crushed by the conveyor, there being provided a set of teeth, placed at the mouth of the conveyor, against which the coal is squeezed and broken. The absence of smoke, reduction in temperature of flue gases and minimum waste are proof of practically perfect combustion. This is the only mechanical stoker successfully adapted for marin[illegible]at can be successfully applied to the internal furnace. Its mechanism is simple and positive, and hand-firing can be resorted to at any time should emergency require it. The speed of firing is regulated at will by throttling the steam supply. A dead fire may be kept indefinitely with little or no care, and heat can be produced that fire cannot stand.

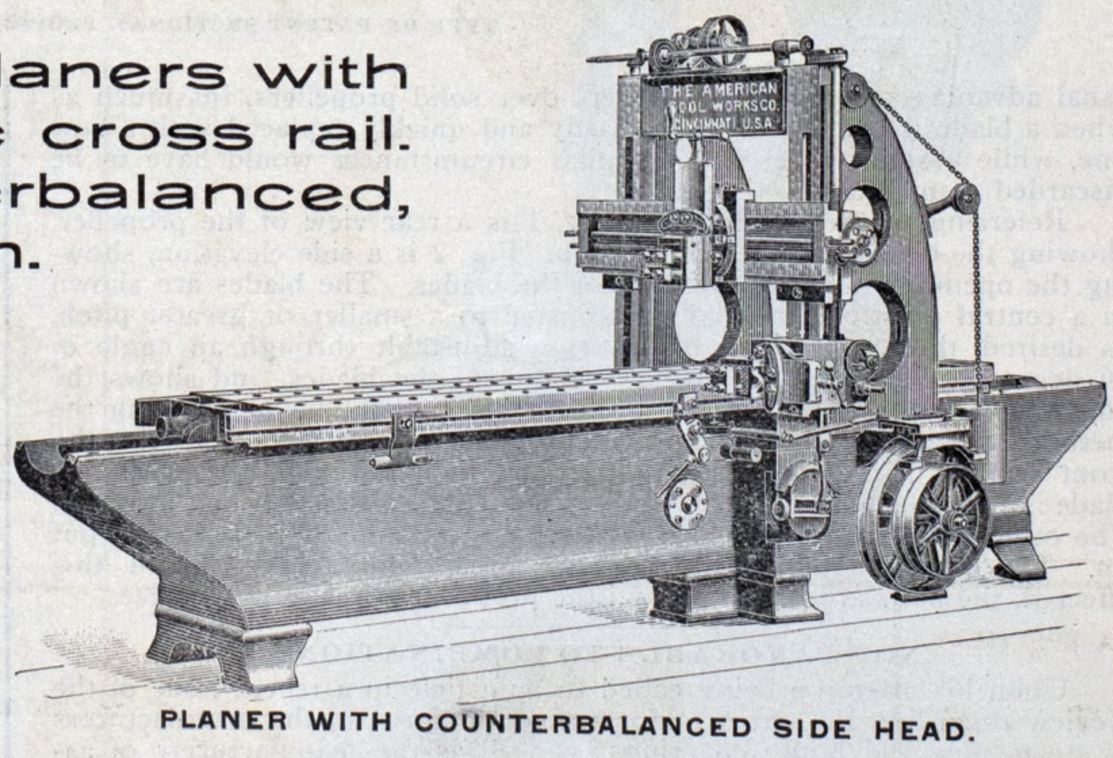
IMPROVEMENTS AT THE CRAMP PLANT.

It is estimated that the value of work which the Cramp Ship & Engine Building Co. of Philadelphia has now under way for the coming year will amount to $19,000,000. In order to accomplish this work it has been decided to double the capacity of the plant, and when the improvements are completed the ship yard will rank among the largest in the world. Charles H. Cramp, president of the company, has stated that it will be necessary to increase the capital stock in order to continue the work of improvements. He has also stated that in his opinion the ship building industry of the country will be conducted in the future by great combinations or industrial corporations. At the present time the company is erecting a large plant for machinery exclusively. It will be one of the largest in the country and will be equipped with all modern devices.

The Calendar issued by the Nickel Plate Road will be mailed to anyone who will send their address to the General Passenger Agent, Nickel Plate Road, Cleveland, O. No. 192. Jan. 15.

PLANERS HAVING ONE OR TWO SIDE HEADS.

WE are prepared to furnish Planers with one or two heads on the cross rail. Also with side heads counterbalanced, as shown in the cut herewith.



PLANER WITH COUNTERBALANCED SIDE HEAD.

These tools are of the most improved design.

We are also builders of a complete line of high grade tools for machine shop equipment.

The American Tool Works Company,

WORKS: CINCINNATI, U. S. A.

NEW YORK OFFICE: 120 Broadway, Geo. Place, Agent.
NEW ORLEANS: The Fairbanks Co.
CHICAGO STORE: 68-70 South Canal Street.
PHILADELPHIA: The Fairbanks Co.
CLEVELAND: The Strong, Carlisle & Hammond Co.
BOSTON STORE: 36 Federal Street.
BALTIMORE: The Fairbanks Co.

SAN FRANCISCO: Henshaw, Bulkley & Co.
DENVER AND SALT LAKE CITY: The Mine & Smelter Supply Co.
LONDON: Alfred Herbert, Ltd., 7 Leonard St., Finsbury, E. C.
DUSSELDORF: de Fries & Co., Act. Ges., Graf Adolf Strasse, 83-87.

ANTWERP: Nyssens Fréres, 33 Rue des Peignes.
BERLIN: de Fries & Co., Act. Ges., Kloster Strasse, 13-15.
PARIS: Roux Fréres & Cie., 54 Boulevard du Temple.
MOSCOW: Alfred Stucken.

VERY LARGE DEMAND FOR METAL-WORKING TOOLS.

Mr. Charles Booth, manager of the Chicago Pneumatic Tool Co., says:

"As showing the general tendency to adopt the best labor saving appliances, and the prosperity of metal manufacturing in all branches, it may be noted that our business for the year just closed nearly quadrupled the business of the previous year, and the mail received Jan. 1 brought orders aggregating one hundred pneumatic tools. These orders were distributed through many different branches of manufacturing, covering nearly all our different varieties of tools, and including, among others, an order for an air compressor and a complete outfit of hammers, riveters and drills for the Kawasaki dock yard at Kobe, Japan.

"Our manufacturing facilities have been taxed to the utmost, and we are now arranging to double our facilities and capacity. The Boyer shops at St. Louis will very shortly move to Detroit, where they will occupy a plant with more than double the capacity of the present shops, and which will be a model machine shop in every particular. We expect also that our Whitelaw shops at St. Louis will be moved to Philadelphia and consolidated with our other shops there, thus affording us a greatly increased output in the line manufactured at these works. The year just opening looks bright for manufacturing and the prospects are that the demand for our tools will not only hold its own, but will be greatly increased."

APPRECIATION OF MR. GRISCOM.

Speaking over the return from England of Mr. Clement A. Griscom, president of the International Navigation Co., the New York Commercial says: "President Clement A. Griscom, of the International Navigation Co., who was recently in London to look after the settlement of the insurance on the steamship Paris, of the American Line, says that under the agreement with the underwriters the steamship will come back to the company's service in about a twelvemonth. The wrecked vessel will be made practically new at the yards of Harland & Wolff, Belfast, Ireland. She will be rechristened and will bear the name of some American city, not yet decided on. It ought to be with a good deal of satisfactoin that President Griscom looks back over the events of the past six years. It was largely through his personal efforts that the two British built ships, City of Paris and City of New York, obtained American registry and gave to the United States navy a magnificent fleet of auxiliary cruisers. When Mr. Griscom was urging this measure upon congress and slowly convincing the opposing ship building interests of Maine, it was not thought that the need of strengthening the navy would come so soon. The first shot fired in Cuban waters made the wisdom of his course plainly apparent and the whole country lined up on his side. It is a little more than six years ago that Mr. Griscom was elected president of the Society of Naval Architects and Marine Engineers, and at the banquet at the Hotel Brunswick in the evening ex-Assistant Secretary of the Navy James R. Soley referred to him as "the American Napoleon of the transatlantic steamship service."

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., January 2, 1900. Sealed proposals for Extension and Repair of Pier at South Haven. Mich., will be received here until 3 p. m., February 1, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs.
Jan. 25.

Wm. Livingstone of Detroit and W. C. Farrington of the Northern Steamship Co., Buffalo, have both been mentioned for the presidency of the Lake Carriers' Association within the past few days. It is not probable that any of the gentlemen thus far referred to in connection with this office would take it unless by unanimous choice, and this matter of unanimous choice will very probably be settled, as usual, and without friction when the time comes. Mr. Livingstone has held the office one term, but his name is again mentioned by Cleveland members of the association on account of the interest he has taken at various times in national legislation affecting the organization and on account also of special adaptability to the presidency. On the other hand, the line interests of Buffalo are regarded as highly important, and it is argued, although Mr. Farrington has probably not expressed himself at all in the matter, that he ought to be asked to take the place.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of Jan. 3. 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	50	50½	48	48
American Steel & Wire, Pfd.....	92½	92½	90	90
Federal Steel	55	55¼	52¼	52½
Federal Steel, Pfd.....	75	75	73¾	74
National Steel	46	46½	43½	44½
National Steel, Pfd.....	93	.....	.....	93
American Tin Plate	33	34½	32	32
American Tin Plate, Pfd.....	.....	.....	.....	.....
American Steel Hoop.....	43¾	45	43	43
American Steel Hoop, Pfd.....	83	.....	.....	83
Republic Iron & Steel	23¼	23¾	22	22¾
Republic Iron & Steel, Pfd	.....	.....	.....	.....

CAPT. GEO. A. SIMPSON, Expert Compass Adjuster,
19 YEARS EXPERIENCE.
Yearly Contracts Solicited. Nautical Instruments Repaired.
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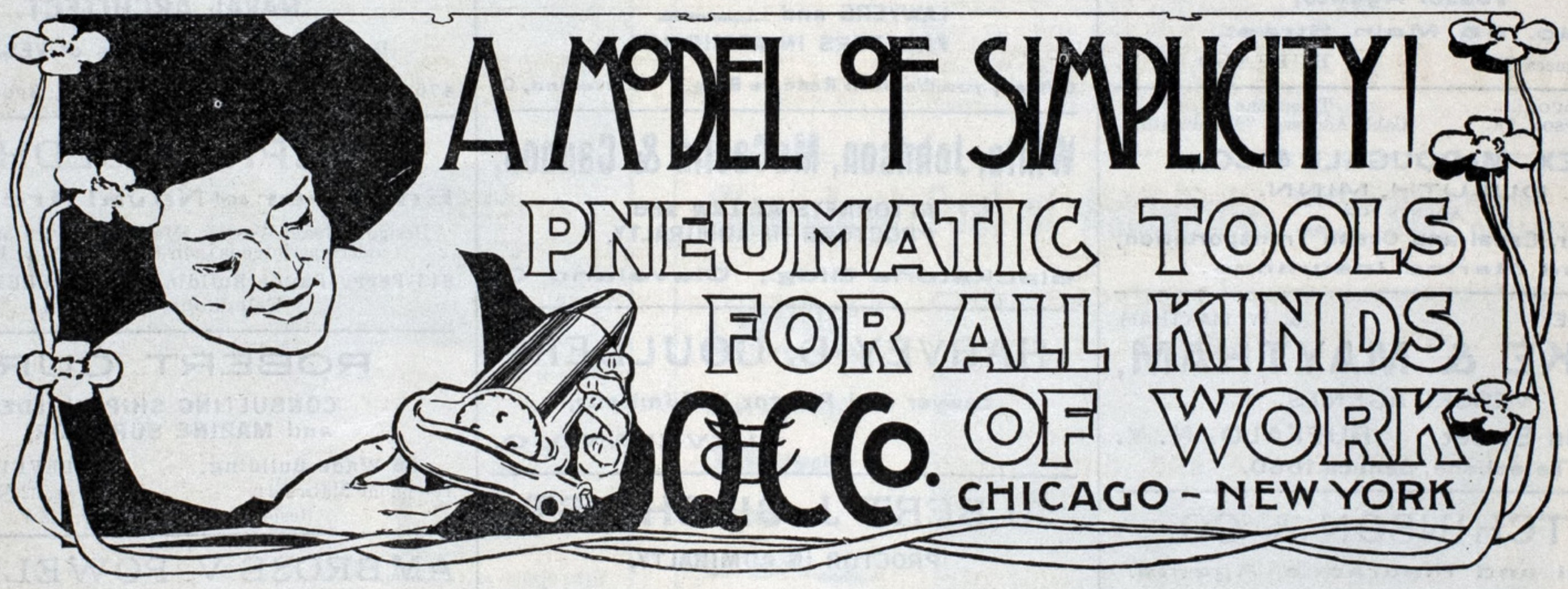

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TOWING LINES AND SHIP'S' HAWSERS

ROPE

THE AMERICAN MANUFACTURING CO.
65 WALL STREET, NEW YORK.
THE LARGEST MANUFACTURERS OF FIBER IN THE WORLD.

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Long Distance Telephone, Harrison 1194.

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Office Telephone 767. Residence, John Mitchell, Doan 341.
John F. Wedow, 158 L. Alfred Mitchell, Doan 197 J.

W. C. RICHARDSON,
VESSEL AND MARINE INSURANCE AGENT,

Office Telephone 338. Residence Telephone 2938.

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59 Chamber of Commerce, MILWAUKEE, WIS.

Telephone Main 369.

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138-139 Rialto Building, CHICAGO.

Long Distance Telephone, Harrison, 1339.

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HALL & ROOT,
Vessel Agents,

No. 55 Main Street,

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ALEX. McDOUGALL.
W. A. THOMPSON, JR.

Telephone 89.
Cable Address: "Macduluth."

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Office Telephone, Main 2453.
Residence C. L. Hutchinson, Doan 19J.

C. L. HUTCHINSON.
W. H. McGEAN. 412 Perry-Payne Building, CLEVELAND, O.

J. H. BARTOW,
Vessel and Insurance Agent

514-516 Perry-Payne Building, Cleveland, O.

TELEPHONE 717.

THOS. WILSON, Managing Owner
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	..	..	New Moon	First Quarter	Full Moon	Last Quarter

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1-10
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Telegraph

Capt. MARTIN SWAIN, CHEBOYGAN, MICH.

TELEGRAPH
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U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., December 14, 1899. Sealed proposals for Construction of Breakwaters at Michigan City, Ind., will be received here until 3 P. M., January 13, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Jan. 4.

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., December 20, 1899. Sealed proposals for Pier Extension at Muskegon, Mich., will be received here until 3 p. m., January 19, 1900, and then publicly opened. Information furnished on application. Chester Harding, Capt., Engrs. Jan. 11.

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Engineer Office, U. S. Army, 185 Euclid Ave., Cleveland, O., December 12, 1899. Sealed proposals for removal of wreck of schooner "Onward" and cargo lying near shore on north side of Port Clinton Harbor, Ohio, will be received here until 2 p. m., standard time, January 12, 1900, and then publicly opened. Information on application. Jared A. Smith, Col., Engrs. Dec. 28 & Jan. 4.

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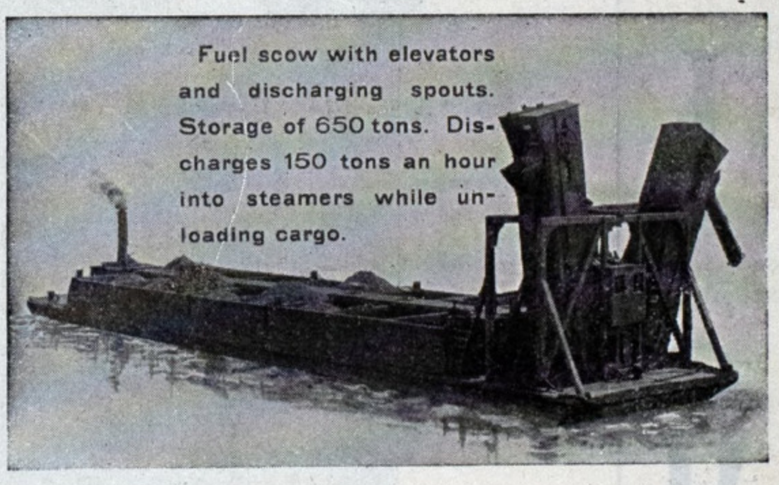
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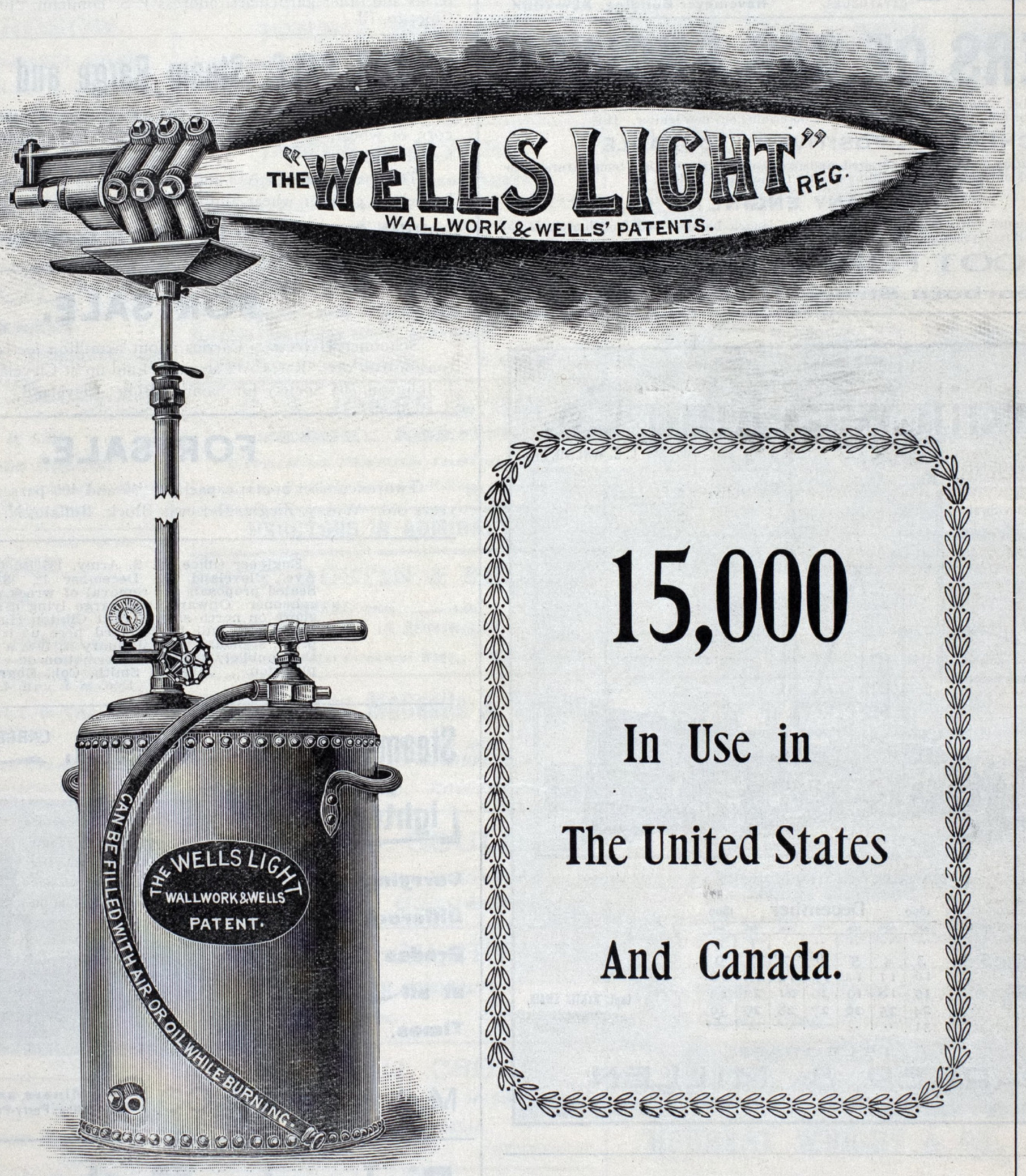
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